ADAPTING AND VALIDATING A PARENT-COMPLETED ASSESSMENT: A CROSS-CULTURAL STUDY OF THE AGES & STAGES QUESTIONNAIRES:INVENTORY IN CHINA AND THE UNITED STATES

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DISSERTATION ABSTRACT

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Title: Adapting and Validating a Parent-Completed Assessment: A Cross-Cultural Study of the Ages & Stages Questionnaires: INVENTORY in China and the United States

The Chinese government has announced the 2013 Guidelines for developing a national system for early detection of disability among children under 6 years of age. However, given limited resources, challenges exist with developmental measures required in the 2013 Guidelines. In order to meet the needs for a more accurate and cost-efficient measure for developmental assessment, the Ages & Stages Questionnaires:INVENTORY was translated into Simplified Chinese, and validated on a regional sample of 812 Chinese children ages from 1-25 months. Psychometric properties were examined; data from previous studies on the ASQ:INVENTORY in the U.S. were compared to identify differences between the two countries. Results indicated that the Chinese ASQ:INVENTORY was an instrument with sufficient internal consistency, reliability and validity. It was well accepted by parents and professionals in China. Findings suggested that the Chinese ASQ:INVENTORY provides a promising alternative measure for screening and diagnosing developmental delays in young children in China. Implications for future research and implementation are discussed.

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CHAPTER I

INTRODUCTION

Scenario. *Chunfang and her two-year-old son, Junjie, have been waiting for almost three hours in a noisy, crowded waiting room in the Department of Developmental and Behavioral Pediatrics at the Child's Hospital of Shijiazhuang. In order to make this visit, Chunfang and Junjie took an overnight train ride to this big city. They live in the Yulin County in Shanxi province where they could not find a developmental pediatrician to answer Chunfang's questions: "What's wrong with my son? Why hasn't he started talking and why is he so restless all day long?" Just when Chunfang felt she could no longer handle another of Junjie's tantrums, a nurse came in and called her number. The mother and son were led to an office with four clean, white walls, a big white desk, and a doctor and his two resident students, all in white gowns.*

After briefly answering several questions about Junjie's birth, daily routines and health history, Chunfang was told to place Junjie in a high chair and keep quiet. The doctor began asking Junjie to do things and to answer questions. Junjie didn't turn his head towards the students when they called his name, didn't followed the toy they swung in front of his face, but just cried and reached out to his mother in the room. Chunfang felt really bad that she could do nothing but watching, as the students instructed. When the students put Junjie on the floor to see how he walks, he dropped onto the floor and rolled back and forth. "He can do all these things at home but is just scared and shy right now," Chunfang tried to explain to the doctor. The doctor replied, "Oh well, it's quite obvious that your child is mentally retarded and needs rehabilitation services. Take this diagnosis with you to your hometown's Disabled Persons' Federation and get an official

Certificate of Person with Disability so that you can register for services. Who's next?" Overwhelmed and confused, Chunfang walked out of the office with Junjie in her arms. She stared at the clock on the wall of the waiting room. Five minutes ago she was hopeful that the expert will tell her how to help Junjie talk; now she felt like she made a wrong decision about this visit, which she felt sentenced her and her child to an ill-fated life. She worried that Junjie would never be allowed to go to school, and would this grow up not having a job to support himself and his future family. "How am I going to tell my husband and his parents when I get home," Chunfang asked herself.

Challenges and Needs in China

This scenario provides a snapshot of a typical Chinese family's experience when they seek professional help to address concerns about their child's development. Chunfang and Junjie, as well as the practitioners who served them, suffered from the critical challenges in the developmental pediatric service system in China, including the lack of reliable and valid assessment instruments, the lack of family involvement in assessment and intervention, and limited available personnel resources.

Lack of reliable and valid assessment instruments. There are only a few developmental screening and diagnostic instruments currently available in China, most of which require trained professionals to administer, and are often outdated, inaccurate, or inaccessible to most practitioners. Similar to this scenario, most Chinese pediatricians do not use assessments and make clinical decisions based on their subjective judgments of certain milestone skills. This challenge is documented in Jin's (2010) article about future directions of developmental pediatrics in China. Researchers have also described the need for updated, valid assessment measures to facilitate accurate and time-efficient clinical

decisions in China (Yang, 2010; Jin, 2010; Liang, 2011; Mao & Jin, 2010; Zou, 2012).

Lack of family involvement. As indicated in the literature (Hu & Yang, 2013; Jin, 2008), the early intervention system in China is still following a traditional, professional-centered, clinical approach; a transition to a more family-centered approach is in great need. The same traditional approach also exists consistently for developmental screening services. As described in Junjie's scenario, identification of developmental delay is usually conducted by medical professionals in clinical settings in a very limited timeframe. Parents and caregivers are usually excluded from the decision making process, similar to Chunfang's experience.

Limitation in available resources. Chunfang and Junjie stayed in the doctor's office for only five minutes, which is typical in pediatric practices in China (Zhou, Pan, & Hou, 2014; Xu & Zhang, 2014). In addition to the heavy caseload in service, most clinical professionals are not equipped with the knowledge and skills needed for developmental screening and diagnosis. Training on child development and assessment have been provided in some medical schools only since 2000 (Jin, 2010). Given the limited supports and a stressful workload, it is not surprising that the turnover rate of pediatricians is increasing in China, which may worsen the shortage of these professionals (Xu & Zhang, 2014). Administration of standardized assessments as a daily practice by pediatric professionals is not realistic, given the limited training, clinical caseloads, and scarcity of resources in China, especially in rural areas (Luo, Gu, Jin, & Hu, 2014).

The great need in China for increased availability of developmental assessment services is due in part to the fact that China has the largest population in the world.

According to the estimates in the Second China National Sample Survey on Disability, the number of children from birth to six who have disabilities is 1.68 million, with an estimated annual rate of increase of 0.19 million (China Disabled Persons' Federation, CDPF, 2006). A report from the CDPF, as cited in Hu and Yang (2013), indicated an annual increase rate of young children at risk or with developmental delays by 0.8 million to 1.2 million. Another article reported that the portion of developmental delay ranges from 1% to 3% in children from birth to five years old, estimates based on the prevalence of mental retardation (Liang, 2011).

National and regional policies have supported the identification of young children who need extra help for their optimal development. In recognition of the significance of early childhood development to the lifelong wellbeing of children and their families, the State Council of the People's Republic of China advocated for improvement of the child health care services system for monitoring and evaluating young children's growth and development (National Program of Action for Child Development, 2011-2020). Regional programs are mandated to provide more contextualized guidance to meet the national requirements. For example, the Beijing City government is planning to cover 85% of all infants under one year old with neuropsychological developmental screening services by 2020 (Beijing Municipal Government, 2011).

In China, public rehabilitation and intervention services are provided by the medical health care system, as well as by the CDPF, a government funded national organization to protect and support people with disabilities. Access to these public services requires official documentation of one of the eight categories of disability: hearing impairment, visual impairment, speech and language disabilities, physical

disability, intellectual disabilities, psychiatric disabilities, multiple disabilities, and other disabilities (Law of the Protection of Persons with Disabilities, 2008). Among children under the age of six who have an identified disability, 67% have received some kind of rehabilitation or intervention services, most of which are hearing and physical therapies (CDPF, 2003). Early intervention services are mostly delivered in hospitals, rehabilitation centers, special education preschools, and at the child's home. Unless a child's family has been identified by the government as living in poverty or the child is in the child welfare system, public rehabilitation and intervention services are usually not free because service providers receive only partial funding from the government.

Limited availability of services and bureaucratic requirements for determining eligibility for public services have led to fully independent private services, in which the families are responsible for all costs (Hu & Yang, 2013). Children do not need an official documentation of their disability to receive private intervention services. However, the cost for placing a child in private organizations ranges from 0.5 to 2 times the average salary of a full-time working person (Ma & Zhang, 2014). The families of children with special needs often face financial stress. A survey in three urban regions -- Beijing, Shanghai and Shandong -- showed that almost 70% of families of children with autism spectrum disorder earned an annual income lower than the average income in their region (Su, Long, Chen, & Fang, 2013). Some local governments in larger cities such as Beijing, Shanghai, and Guangzhou have just started to develop systems to reimburse families for a part of their expenses for intervention services (Chen, 2014). Public funding for private services requires documentation of disability of children who receive the services. However, eligibility evaluations are not in the repertoire of many private rehabilitation

and intervention service providers. A feasible tool or method to provide or assist in documentation of disability eligibility is needed.

In addition to rehabilitation and intervention services provided by the medical system and the CDPF, children with disabilities are encouraged to enroll in early childhood education such as childcare and preschools (Hu & Yang, 2013). However, the preschool enrollment rate of this population is 61% in urban areas and 26% in rural areas, much lower than for children without disabilities (Brief in National Sample Survey of Children 0-6 with disabilities, 2001). Only a few special schools, such as the Shanghai School for Blind Students, have preschool programs where the needs of children with mild to moderate disabilities are often not met, because the curricula in these special education programs were developed for children with severe disabilities. As a result, many preschoolers with mild to moderate disabilities are enrolled in general early childhood programs. Several studies indicate that preschool teachers are not confident in including children with special needs in their classroom, which is primarily due to a lack of pre-service training in special education and in-service supports, and large class sizes (Sun, 2007; Tan & Yun, 2008; Yan, 2008; Zhang, 2006). The State Education Bureau of People's Republic of China has announced a goal to boost the enrollment of children with special needs in general child care and preschools (Shi & Liu, 2014). However, early childhood professionals are in need of knowledge and skills to assess and support the development of children who are not typically developing in order to successfully include them.

Assessment of the developmental level in young children is typically completed by medical professionals, such as physicians, pediatricians, and community-based well

child care practitioners (Hu & Yang, 2013). Assessment of intelligence is also available for children of school age (i.e., above six) in some special education schools for children with intellectual disabilities. Even children who are already receiving services in public and private intervention and rehabilitation organizations may still have to go to medical professionals for developmental assessments (Jin, 2010). This gap between assessment and intervention/education makes it difficult to develop intervention plans based on assessment results.

In hospitals and health care clinics, child development assessments are administered for four different purposes: screening, diagnosis, monitoring, and outcome evaluation. According to the National Preventive Plan to Children with Disabilities, China is setting up a nationwide system for the early identification and intervention of three types of disability affecting the largest populations: visual impairment, hearing impairment, and intellectual disabilities (CDPF, 2011). This national plan clearly describes the roles and responsibilities of each service provider in the system. Community health care centers and other local primary health care providers are held responsible for administering early screening tests on children from birth to six. Children who are identified with high risks for disabilities will be registered in the Child and Maternal Health department in the local government and referred to qualified medical service providers for diagnostic assessments. According to the diagnosis, children will then be referred to needed medical treatments and/or rehabilitation services, and their information will be shared with the local CDPF for more intervention services. By sharing information between the health care system and the CDPF system, children who are diagnosed with a disability will be routinely monitored. In addition to screening and

referral, community health care providers are also responsible for disseminating information about child development, risks and disabilities, pregnancy health and new born care. In order to meet the goal of reaching 80% of all children under the age of six with disability screening, the national government grants 300, 000 RMB or nearly $50,000 for pilot implementation in participating cities.

It is a challenge to the current health care system in China to meet such a high demand of services required in the National Preventive Plan to Children with Disabilities. As described above in the beginning of this section, developmental assessment practices are facing crucial challenges, including a shortage in reliable, valid, and accessible assessment measures. Many developmental assessment tools used in China to screen, diagnose and monitor young children are based on normative samples collected in China 20 or 30 years ago (Lin, Li, & Zhang, 1986; Zhu, Lu, Tang, Wang, & Song, 1983; Zhu, et al., 1984). The most commonly used developmental screening instruments require administration by trained professionals in clinical settings, using scripted instructions, standardized materials and procedures, such as the Denver Development Screening Test (DDST), the Mental Developmental Screening Test for Children (MDSTC), and the Bayley Infant Neurodevelopmental Screener (BINS). During a five minute doctor's visit, it is challenging for professionals to complete a screening assessment on a child they meet for the first time, not to mention to conduct a diagnostic assessment with the Bayley Scales of Infant Development (BSID) or any other diagnostic instrument available in China. Adding requirements for monitoring development and evaluating outcomes on children who have been diagnosed as having a delay or a disability, as described in the National Preventive Plan, will only increase the demands for assessment services.

In order to bridge the gap between the rising demand for services and the limited resources available, China needs reliable and valid instruments that are flexible in administration. Two approaches may meet this critical need: to create and develop new Chinese instruments for this purpose, or to introduce adapted high quality instruments from foreign countries.

In order to have cost effective assessment tools in a timely manner, adapting existing tools from another language and culture seems to be more realistic (Hambleton, 2005). However, an instrument that is adequate and effective in one culture may not be reliable and valid in another culture, with possible errors or variations in translation or a mismatch between cultural practices and expectations compromising the accuracy and utility of results. Using a careful and systematic procedure following recommended guidelines to translate and adapt an instrument can facilitate better cultural equivalence between the original and adapted versions of the instrument (Hambleton, 2005; Canino & Bravo, 1999). A careful and thorough approach will be necessary when adapting existing instruments for use in China.

The Ages & Stages Questionnaires:INVENTORY

The Ages & Stages Questionnaires: INVENTORY (ASQ:INVENTORY) is an assessment tool developed for two purposes: developmental screening and progress monitoring (Clifford, 2006). Preliminary evidence on the use the ASQ:INVENTORY in the U.S has been gathered. (Clifford, 2006; Bae, 2007), as well as in Taiwan (Chen, 2013). The items on the ASQ:INVENTORY are from the Ages & Stages Questionnaires, Third Edition (ASQ-3; Squires & Bricker, 2009), a parent-completed screening measure that has been validated and widely used in the U.S., as well as in many other countries

including China (Squires & Bricker, 2009/2013), Korea (Heo, Squires, & Yovanoff, 2008), and Canada (Dionne, Squires, Leclerc, Peloquin, & McKinnon, 2006). The ASQ:INVENTORY shares many of the advantages of the ASQ-3, including promoting parent involvement, assessing the child in authentic settings, culturally flexible items and administration methods, and comparing the performance of a child to same aged peers (Clifford, 2006). Scores on the ASQ:INVENTORY also can be converted to ASQ-3 scores for the purpose of developmental screening. The flexibility and ease in administration in addition to the multiple purposes of the ASQ:INVENTORY provide promising assessment alternatives for programs with limited resources and funding in China and elsewhere.

The purpose of this research study was to adapt the original ASQ:INVENTORY to a Simplified Chinese version, and to examine the validity and feasibility of using the adapted ASQ:INVENTORY for screening and as an indication of eligibility status with a population of Chinese children from birth to age three years. Research on the adapted ASQ:INVENTORY consisted of a series of studies. First, an equivalence study examined the item functioning within and between the ASQ:INVENTORY English and Simplified Chinese versions with children and caregivers. Second, a preliminary psychometric study established a regional normative sample, as well as gathered pilot evidence for the reliability and validity of the ASQ:INVENTORY in China. Third, a cross-cultural study measured possible different response patterns to the ASQ:INVENTORY in China and the U.S. Finally, a social validity study investigated the perceived usefulness and the cultural appropriateness of the ASQ:INVENTORY in China.

CHAPTER II

REVIEW OF LITERATURE

A review of the existing literature on developmental screening, screening assessments in China, and cultural factors to consider when translating and adapting assessment instruments across different cultures is presented. Implications for the research study are discussed.

Early Detection and Developmental Screening

Early detection, or Child Find, is an assessment process to identify "children who may have a medical, learning, or environmental condition that interferes with their acquisition of critical developmental skills." (Bricker, Macy, Squires, & Marks, 2013, p. 5) Early identification of children who may have a developmental delay, as well as referral for further diagnosis or intervention services, is fundamental to improve child and family outcomes as well as contributing to the common benefit of the society (Gilliam, Meisels, & Mayes, 2005; Guralnick, 1997; Meisels & Shonkoff, 2000). In both China and the U.S., early detection is considered the important first step in identifying children who may need specialized early intervention/early childhood special education (EI/ECSE) services (Guralnick, 2005; Liang, 2011; Jin, 2010).

Components in Early Detection

As the first component in an early detection system, developmental screening should be described in relation to two components: monitoring and referral. *Developmental screening*, or *traditional screening* (McLean, Hemmeter & Snyder, 2014), refers to a brief assessment process to discriminate children who need further and more comprehensive assessment from those who do not (Bricker, et al., 2013, p. 6-7).

Compared to a diagnostic assessment, a screening assessment is quick and easy to administer and therefore can be implemented on a larger number of children at repeated intervals. For example, the ASQ-3 can be completed by parents in 10-15 minutes (Squires, Twombly, Bricker, & Potter, 2009). If a child is not found eligible for services, he or she should receive continued follow-along developmental screening or developmental monitoring. For example, a child who has not been identified as needing further assessment may still need to be screened at regular periodic intervals to identify delays as soon as they occur. If a child shows potential delay on a screening assessment, he or she should be referred for eligibility determination (Bricker, et al. 2013). For example, a child who has been identified as having potential needs in one or more developmental areas should be referred for diagnostic assessments to evaluate eligibility for services.

Early detection of potential developmental delays or problems on a large scale is necessary in order to have the timely, accurate identification of children who may benefit from EI/ECSE services (Gilliam, Meisels, & Mays, 2005). Figure 1 illustrates the components of an early detection system, as well as its link to the EI/ECSE system.

Procedures in Early Detection

The detection of children who may benefit from EI/ECSE services often starts with developmental screening, which can be initiated by health care providers during regular well-child check-ups or early childhood education and child care professionals working with young children (Bricker et al., 2013). Three results are possible, leading to next steps. A child who appears to be developing typically will not be referred to further assessments but may receive a rescreening or developmental monitoring at regular

intervals to assure development continues to appear typical (Bricker et al., 2013). A child whose results indicate risk in terms of development should be referred for further eligibility assessment. A child whose results are questionable (e.g., not falling in the "at risk" category but very close), and/or whose parents reported concerns should receive further evaluation or referred to community resources, or provided with targeted activities to promote growth in areas of concern. The results from an eligibility evaluation will determine whether the child is eligible for EI/ESCE services.

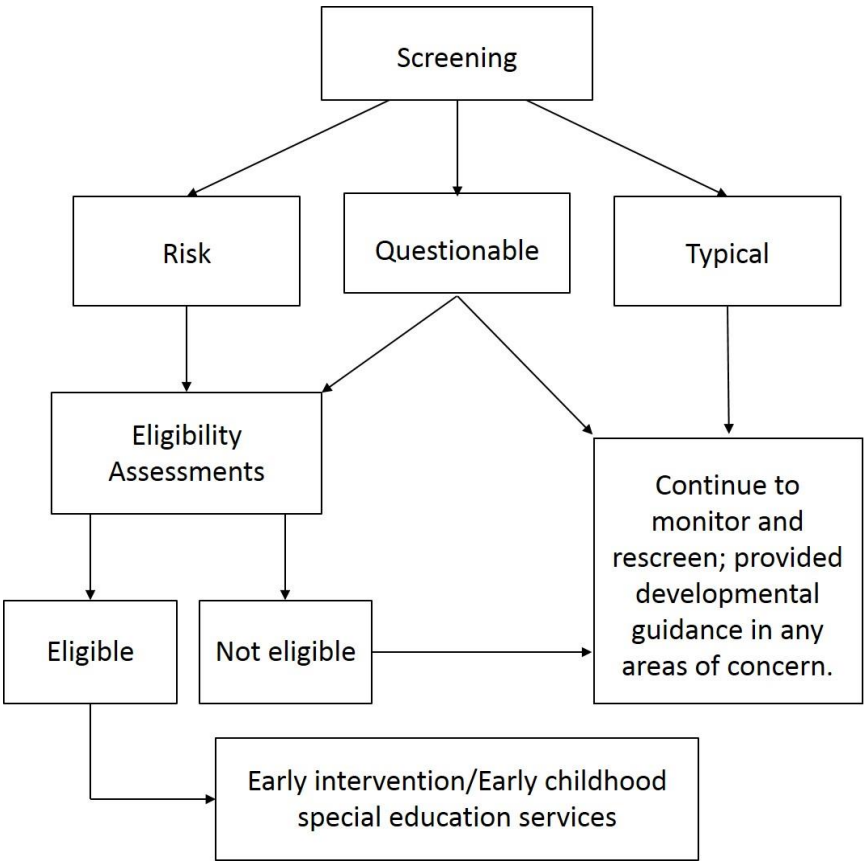


Figure 1. Early detection of needs for early intervention/early childhood special education. Adapted from "General screening procedures" by Bricker et al., 2013, *Developmental screening in your community: An integrated approach for connecting children with services*, p. 36. Copyright 2013 by Brookes Publishing.

Recommended Practices in Developmental Screening

The recognized significance of early detection and services for children who have or may have a developmental delay underscores the importance of implementing high quality developmental screening assessments using recommended practices. McLean (2004) recommended three guidelines for screening practices: 1) multiple sources of information, including collecting comprehensive information about a child's development from a variety of sources; 2) a family-centered approach, and actively involving families in the assessment process; 3) effective evaluation, including selecting technically adequate screening instruments and evaluating to what extent a screening program is meeting its expected goals.

Multiple sources of information. Young children behave differently across different contexts (Gilliam, Meisels, & Mays, 2005). A screening assessment should obtain authentic and meaningful information about a young child's comprehensive developmental status across multiple settings to make the best judgments (Meisels & Atkins-Burnett, 2000; Neisworth & Bagnato, 2011).

Direct testing by unfamiliar adults in unnatural settings is considered inappropriate for infants, toddlers, and preschoolers, and may yield inaccurate information about their skills (Bagnato, 2007). Therefore, efforts to assess a child's development should include observing the child in natural contexts, such as at the child's home or in a day care center that the child attends on a regular basis. A variety of methods can be used to gather information from multiple sources, including parents and other caregivers who spend considerable periods of time with the child (Division for Early Childhood, DEC, 2014). These methods include observing the child and

interviewing adults who are familiar with the child. Bagnato, Neisworth and Pretti-Frontczak (2010) also suggest arranging activities and the environment to attempt to to elicit targeted skills from the child when necessary. It is important to collect information about a child's development in all developmental areas (e.g., motor, cognitive, social-emotional) to inform decisions in a screening assessment (Guralnick, 2005).

Family-centered approach. Characteristics of family members, such as education level, parenting skills, cultural values and beliefs, as well as the dynamic interactions among family members (e.g., parent-child interactions) play an important role in a child's life (Hanson & Lynch, 2013). Involving families in the assessment process is recommended in both EI/ECSE (DEC, 2014) and in early childhood education professional standards (Copple & Bredekamp, 2009). Federal legislation such as the Individuals with Disabilities Education Act (2004) also emphasizes involving parents in the assessment and intervention procedures for their children.

As McLean and Crais (2004) point out, having parents complete an assessment of their children has become a frequent practice by professionals due to four reasons. First, parents have a large amount of knowledge of their children (Guralnick, 2005), and are able to correctly identify concerns about their child's development (Glascoe, 1999; Diamond & Squires, 1993). Second, increased emphasis on collecting authentic information in a child's natural environments has facilitated a larger role for parents in the assessment process. The third reason for increased parental role in assessments is the availability of assessment instruments that encourage family involvement, such as the ASQ-3 (Squires & Bricker, 2009). Finally, having parents complete the assessment can be a more cost-effective and less time consuming approach for developmental screening

(Clifford et al., 2011).

Delivering family-centered screening services requires culturally and linguistically responsive practice (Hanson & Lynch, 2014). Clifford and colleagues (2011) discuss several cultural and linguistic considerations in developmental screening, including using the primary language of the child and parents, measuring the cultural match between the assessment instrument and the culture of the family, understanding how culture impacts the developmental and behavioral expectations of a child, and evaluating how well the child is represented by the normative sample in the assessment.

Effectiveness evaluation. The evaluation of whether a developmental screening program is meeting its goals includes several components. First, screening instruments should be technically adequate and appropriate for the population served. Second, follow-up evaluation is needed to find out whether the assessment is accurately identifying and referring children for next-step services that they really need (McLean, 2004). In addition, Bricker et al. (2013) suggest considering effectiveness at a system level to examine the extent to which services are coordinated, are accessible to targeted populations, and have sufficient resources.

Using psychometrically sound instruments to screen young children is recommended by researchers (Macy, 2012; McLean, 2014; Buysse & Wesley, 2006), as well as by professional associations such as the American Academy of Pediatrics (2006), the DEC (2014), and the National Association for the Education of Young Children (NAEYC, 2003). Clifford et al. (2011) describe considerations for selecting screening tools with regard to their technical adequacy (e.g., how well the normative group is representative of the population of a child, how accurate and consistent is the assessment

result), age range (e.g., is the tool developed for infants only, or does it cover children from birth to school age), targeted domains (e.g., does the tool identify children with autism spectrum disorder only, or assess the general development of a child), and administration requirements such as who are the respondents and how to complete the assessment.

As Salvia, Ysseldyke and Bolt (2013) point out, the psychometric properties of an instrument are not static. Rather, using an instrument with established evidence for its reliability and validity is just the first step. The technical adequacy of an assessment is also affected by the specific individual and the context of use. In practice, the effectiveness of a screening assessment can be evaluated by tracking children who have been screened to collect information from further assessments. If children who were referred for further assessment are found eligible for EI/ECSE services, and children who were deemed typically developing by the screening assessment are found not eligible for services, the screening assessment is considered effective and meeting expected goals. Comparing the agreement between the results from a screening assessment and the subsequent eligibility assessment is helpful to determine to what extent the screening assessment is identifying children who indeed need further services. However, error always exists in measurement, including in screening assessments (Salvia, Ysseldyke, & Bolt, 2013). When a screening assessment is referring children who are later not found eligible for EI/ECSE services, an error called false positive occurs, wasting resources and causing unnecessary anxiety for the family. Another type of error occurs when a screening assessment fails to identify children who are actually in need of services. This second type of error, called false negative, is usually considered more serious because it

fails to meet the primary purpose of screening -- identify and serve children early for better outcomes, and children with delays or developmental concerns may be "missed" (McLean, 2004).

The high prevalence of developmental delay and the dynamic nature of child development requires periodic and systematic screening assessments to timely and accurately refer children for eligibility evaluation (Gilliam, Meisels, & Mays, 2005; Bricker et al., 2013). However, young children are often not in service delivery systems as are children at school age (McLean, 2014). Failure to identify children who need specialized service is a common barrier to effective delivery of EI/ECSE services (Bricker et al., 2013; King, et al., 2010; Halfon, et al., 2004; O'Harra, Church, & Blatt, 1998). A call for systems change has been stated (Clifford, et al., 2011; Bricker, et al., 2013; McLean, Hemmeter & Snyder, 2014). Bricker and colleagues (2013) suggest establishing universal, coordinated early detection/Child Find systems consisting of six components: program goals, community awareness, contact/referral, developmental-behavioral screening, follow-up, and overall evaluation. This coordinated systems approach is expected to be more effective and efficient in identifying developmental problems in young children.

Recommended Practices in Eligibility Determination

The primary purpose of an eligibility assessment is to determine whether certain conditions exist that qualify a child for related intervention and rehabilitation services (Snyder, McLean & Bailey, 2014). Eligibility criteria differ in different countries. However, standardized, norm-referenced instruments have been incorporated as a component in the eligibility assessment process in many states in the U.S. (McLean,

2014), as well as in other countries (Visser et al., 2012) including China (Hu & Yang, 2013). Similar to the recommended practices in developmental screening, multiple sources of information, family involvement, and psychometric qualities are also important considerations when administering eligibility assessments.

Besides using standardized, norm-referenced assessments, the Individuals with Disabilities Education Act (IDEA) Amendments of 2004 (PL 108-446) recognizes the needs for using "informed opinion" when determining the eligibility status of infants and young children. Neisworth and Bagnato (2011) define informed opinion as a practice of sharing information and making joint decisions by a team of specialists who are familiar with child development in general. Using informed opinion is especially critical when standardized instruments are not appropriate for the child or not available, due to limitations in resources and personnel. Neisworth and Bagnato (2011) also suggest five essential features of informed opinion: requiring clear definitions for judged characteristics (i.e., everyone understands what is being observed and judged), structured opinions (i.e., everyone rates in the same way to yield comparable opinions), information across people (i.e., include inputs from people who spend a large amount of time with the child), consensus process among parents and professionals (i.e., sharing opinions equally), and training for all raters (i.e., ensure everyone records opinions in the same way).

Early Detection System in China

As discussed in chapter one, the medical maternal and child care system in China is responsible for early identifying children who are at risk for disability (Jin, 2012; Chinese Center for Disease Control and Prevention, CCDCP, 2013 a). Early efforts in

developmental screening can be traced back to the late 1970's (Guo, Gong, Tao, & Li, 1981). Practices have transformed and evolved as changes occurred in the cultural context of child development and disability, in the authorization of legislation and policies, and due to the maturity of developmental pediatrics as a new discipline of science.

Cultural Context

The first step to the understanding of the early detection system in China is to examine cultural values, beliefs and the policies related to child development and rearing. The blending of traditional cultures such as Confucianism, Taoism, and Buddhism, and the political convention of Marxism provide a unique and complex cultural context in modern China (Bell, 2010). The rapid changes in the Chinese society and the enormously varied urban and rural areas further complicate the examination of the Chinese culture. Nonetheless, certain values are shared consistently by people from diverse demographic backgrounds: family as the basic unit of the society, raising children for future return (Zhang & Xu, 2007), and disability as a stigma (Fong & Hung, 2002; Yang & Pearson, 2002).

Family as the basic unit of the society. According to the Chinese Encyclopedia: Sociology (1991, p. 102), a family is "an essential unit of social life, which is tied through relationships of marriage, blood, and adoption". Influenced by Confucian values and beliefs, education is always considered as an honored and important way to achieve the desired success -- higher social class status, defined by not just wealth, but also education background, type of occupation, and contribution to the family and the society (Huang & Gove, 2012). The interdependent relationships in Chinese families may

explain the high level of involvement of parents in early intervention services for their children (McCabe, 2010). For example, parents are viewed as the child's first teacher, and families are viewed as the primary agent to protect and advocate for their children's wellbeing (Garguilo & Piao, 1996; Feng, 1996). Furthermore, due to the tight connections between family members and the high employment rate among women, grandparents and other members from the extended family can be important resources for child rearing (Yin, 2011; Wang, 2014). In addition to potentially stronger supports from the family, interdependent relationships can also increase parental stress related to concerns of their children's development (Wang, 2014).

Raising a child for return. As discussed above, Chinese parents often highly value their children's academic achievement and consequently social class. They consider this an important part of the responsibility of parenting, and even an honor for the family and clan (Zhang & Xu, 2007). As a return, grown up children are expected to take care of their aging parents (called "fan bu" in Chinese) and to carry on, if not raise, the social class of the clan (called "guang zong yao zu" in Chinese). Although there are more nuclear families now than multi-generation families in China, the law explicitly describes the responsibility of grown up children to "frequently" visit their aging parents and provide emotional and financial supports (Law of Protection of Rights and Interests of the Aged, 2012). The legislators emphasized an encouraging approach (e.g., no penalty to disobedience), but this law reflects the common expectation of "fan bu". The "one-child" policy in China only concentrates parents' expectations on the only child of the family. On the other hand, children are considered the "successor of the socialist cause" in the Chinese communist convention. Education for children is primarily aiming to

enhance the moral, intelligent and physical development of future constructors of "socialist modernization" (Education Law of the People's Republic of China, 1995). Similarly, health care for children aims to provide high quality human resources for the progress of the society and the vigor of the nation (State Council, 2011). From these perspectives, children with disabilities are considered less likely to return and serve back, and their strengths may be overshadowed by their disability. Therefore developmental screening starts from prenatal stage, and aims to reduce the population with disabilities and the burden on families and community, followed by enhancing the quality of life for people with disabilities (Zheng, 2010).

Disability as a stigma and shame. Disability is stigmatized in China, as in many other countries. Research has documented that the stigma and shame associated with the disability of a child often causes significant stress and pressure to many parents and families (Wang, 2014; Meng, Liu, & Liu, 2007; Zhang, & Rong, 1997; Li, 2011). Influenced by the beliefs of Confucianism, Taoism, and Buddhism, disability is often considered as a punishment for past sins or bad luck of the child or to the family, especially in rural areas in China (Garguilo & Piao, 1996; Chiu, Yang, Wong, Li & Li, 2013). Related to the expectation of "fan bu", low expectations of children with disability can result in a feeling of "losing face" – disappointment and/or embarrassment-- for family members (Chiu, Yang, Wong, Li & Li, 2013). These negative perceptions of disability may result in parents being reluctant to access assessment services to identify problems (McCabe, 2008). However, due to the general low expectations of children with disabilities, the "one-child" policy allows parents who have a child with an identified disability status to have a second child which is otherwise forbidden (Chen, 2010). This

policy may actually serve to encourage parents to seek developmental assessment services for their children in order to obtain a diagnosis for the first child and receive permission to have a second child. As indicated in the literature, in China it is often up to the parents to take the initiative to access and pay for developmental evaluation services (Hu & Yang, 2013). The stigma and shame associated with disability and the possibility of having a one more child can post conflicting considerations in many parents' decision making process.

Legislation and Regulations

Two national laws and related administrative regulations in China were authorized in recognition of the importance of the detection and intervention of children with disabilities from birth to six. Although developmental screening services are not mandated in any of these legal documents, they provide guidelines and sometimes even funding for establishing a system for service delivery in the child health system and the CDPF system (Hu & Yang, 2013). The national legislative framework related to early detection in China consists of the Law on Protection of Persons with Disabilities (2008), the Law on Maternal and Infant Health Care (1994), the National Program of Action for Child Development – 2011 to 2020, the National Program of Action for Disability Services - 2011 to 2015, and the 2013 Guidelines for a Developmental Screening System.

Law on Protection of Persons with Disabilities. This law was first authorized in 1990 with the most recent amendment in 2008 (State Council, 2008). It is the first law in China to specify categories for disability eligibility and to call for public disability prevention and rehabilitation services. Eight categories of disability are described, including hearing impairment, visual impairment, speech and language disabilities,

physical disability, intellectual disabilities, psychiatric disabilities, multiple disabilities, and other disabilities. This important legislation for people with disabilities outlines the nation's responsibility to provide public services in disability prevention, including the dissemination of information about healthy pregnancy and healthy child rearing; and the making of laws and regulations to advocate for efforts to address factors causing disabilities including genetics, diseases, drug abuse, physical injuries, natural disaster, and pollution in the environment. This law does not address when, how, for whom and by whom to deliver disability prevention practices. Instead, specific information about the prevention service system is addressed in administrative regulations. Although developmental assessment services for young children are not mentioned specifically in this law, a consensus has been established that developmental assessment during the early years is a critical component of disability remediation and prevention (Liang, 2011; Zhang & Yu, 2012; Chinese Center for Disease Control and Prevention, 2013 a).

Law on Maternal and Infant Health Care. As an effort to reduce "inferior-quality births as quickly as possible" (National Health and Family Planning Commission of the PRC, 1995), this law was authorized in 1994 and provides more specific description of the nation's disability prevention efforts (State Council, 2005). According to this law, the first phase of disability prevention is premarital examination of hereditary or contagious disease, which are likely to affect the health of the couple's future children. Identified risks in reproduction can result in the rejection of the marital application, unless the couple agrees not to have a child. This premarital reproductive risk examination was mandatory from 1995 to 2002, then made voluntary nationwide in 2003 (Ebrahim et al., 2006). It was reported that the premarital check-up rate has dropped from

about 80% in 2003 to 41% in 2011, and the rate of newborns with medical problems has increased during the same time (Wang, 2013). The second step of disability prevention in the Maternal and Infant Health Care law refers to prenatal examinations to identify serious hereditary diseases and deformity of the fetus, as well as possible harm to the life of the pregnant woman. When the risk of any of these conditions exists, physicians are mandated to report it to the couple. Free services are provided if the couple decides to terminate a pregnancy. Compared to the detailed description of premarital and prenatal examinations, the description of services after a child is born is brief: "newborn care, referral of mortality and deformity of the new born, and the requirement of health service providers to support evidence-based child rearing practices". As an example, it is recommended that health care practitioners conduct physical well child check-ups and immunizations for infants, as well as disease prevention screening and intervention. However, the law does not specify when, by whom, and how to deliver these services. Specific guidelines for practice are provided in several administrative legislations.

National Program of Action for Child Development, 2011-2020. This regulation describes the goals and approaches in promoting child development in five sections: health, education, welfare, environment, and legal protection. Developmental screening services are required in the health section. A goal of reaching 80% of all children under the age of seven with developmental well checks is clearly stated. In the environment section, this program aims to establish community child service centers in 90% communities nationwide to provide resources for child play, recreation, education, health care and mental health support and referral for children and their families. A family-school-community collaborative system is described in the legal protection area to

implement early intervention for children who have challenging behaviors. Guidance on how to monitor and evaluate the implementation and effectiveness of this national program is also provided. Outcome data (e.g., number of children who received developmental well checks, number of community child service centers, number of children referred for specialized services) are collected by the statistical office at the national, provincial and local levels in annual, midterm and final reports to the Working Committee on Children and Women under each level of the government.

National Program of Action for Disability Services, 2011-2015. In this national five-year plan, goals and steps to advance the services for people with disability are described. Among the sixteen sections of services, the disability prevention section requires establishment of a nationwide, cross-disciplinary system to "screen, report, refer and provide rehabilitation services" for children from birth to the age of six (State Council, 2011). The purpose of this zero-to-six disability service system is to prevent the occurrence of and reduce the severity of disabilities with high incidence, such as autism spectrum disorder, cerebral palsy, and intellectual disabilities. This is the first time early detection of disability targeting infants and young children is documented in the national program. Based on the requirements in this regulation, the CCDCP, entrusted by the CDPF and the National Health and Family Planning Commission, developed the 2013 Guidelines for disability screening on children from birth to six (2013 Guidelines, CCDCP, 2013 a) to inform practices.

2013 Guidelines for a Developmental Screening System

The 2013 Guidelines are the first effort in China to explicitly describe how professionals from different disciplines collaborate to form one overarching disability

detection and rehabilitation system. Guidelines for practice are provided on the targeted population, services, government departments for delivery, roles of each department, personnel and agency qualification, referral system, and program evaluation.

Targeted population. The 2013 Guidelines dictate the disability detection (i.e., screening and diagnostic assessments) services for children from birth to six years old in China. Five categories of disability are targeted in this system: hearing impairment, visual disability, physical disability, intellectual disabilities, and autism spectrum disorders. Definitions and criteria for each disability are summarized in Table 1.

Table 1. *Definitions and Criteria of Five Categories of Disability*

Category	Definition	Diagnostic Criteria
Hearing disability	A permanent hearing loss of all different degrees in both ears that prevents a person from receiving sounds and speech from the environment. Limitations in communication and understanding impacts daily living and participation in the community.	• A hearing loss more than 40 decibels Hearing Level in the better ear.
Visual disability	Eyesight impairment that cannot be corrected, or peripheral vision loss that impacts daily living and participation in the community.	• Eyesight lower than 0.3 in the better seeing eye, or • A visual field less than 10 degrees in the better seeing eye • Cannot be corrected
Physical disability	Impairment of the physical motor system that resulted in damage to the four limbs or the spinal system, which limits an individual's motor function in daily living and participation in the community	• Orthopedic impairments caused by Neurological disability or disease, or • Damage to the upper or lower limbs, or • Spinal disability or disease

Table 1. *(continued)*

Category	Definition	Diagnostic Criteria
Intellectual disability	Disabilities of the neuropsychological structure and function caused by any aversive factors, accompanied with adaptive behavior disabilities. Impacts daily living and participation in the community. Originates in the age of intellectual development.	• Developmental quotient less than 70, and • Identified adaptive behavior disability
Autism spectrum disorder	A developmental and mental disorder characterized by difficulties in social interaction, communication, repetitive behaviors and narrowed interests. Originates before three years old.	• Meeting the criteria in the Third Edition of Chinese Classification of Mental Disorders (CCMD-3) for the three core characteristics • Originated before three years old • Possibilities of other types of mental disorders are ruled out

Services. The 2013 Guidelines mandate disability detection during regular child well check-ups following the procedural and instrumental requirements pertaining to each of the five types of the disability in three phases: initial screening, secondary screening and eligibility determination. The three phases of early detection will be implemented in the existing three-tier child health care system: community/village health care centers, district/county health care providers, and municipal/prefectural health care providers. Assessment services are provided at these three local levels; assessment results are reported to the provincial health department and then to the national public health department.

Involving government departments and roles. The disability detection system is integrated into the existing maternal and child health care system, and supervised by the national and local Health and Family Planning Commission (HFPC) and CDPF. The

HFPC supervises and supports the delivery of *assessment* services, including developing a short term service plan in the community, preparing personnel to administer assessments, sharing assessment results with the CDPF, evaluating the qualification of service providers, and evaluating the effectiveness of the local assessment service system. The CDPF supervises and supports the delivery of *rehabilitation and intervention* services, including disseminating information about disability prevention, providing rehabilitation and intervention services for children who are eligible, communicating rehabilitation outcomes with the HFPC, evaluating personnel and agency in rehabilitation services, and evaluating the effectiveness of the local rehabilitation system. Collaboration between the HFPC and CDPF is required in order to effectively refer children between assessment and rehabilitation, as well as to share information for program evaluation. Figure 2 illustrates the participating government departments, service providers, their roles and collaborative relations.

Personnel and agency qualification. The 2013 Guidelines require professionals with related training background to be qualified to use the required clinical assessment procedures to identify young children with disabilities. Initial and secondary screening assessments can be implemented by professionals with a general medical training background who are working in health care agencies (e.g., hospitals, clinics and community centers). Eligibility assessments should be administered by professionals who are trained to use specific diagnostic assessments, such as the Beijing Gesell Developmental Schedule (Beijing GDS; CCDCP, 2013 a).

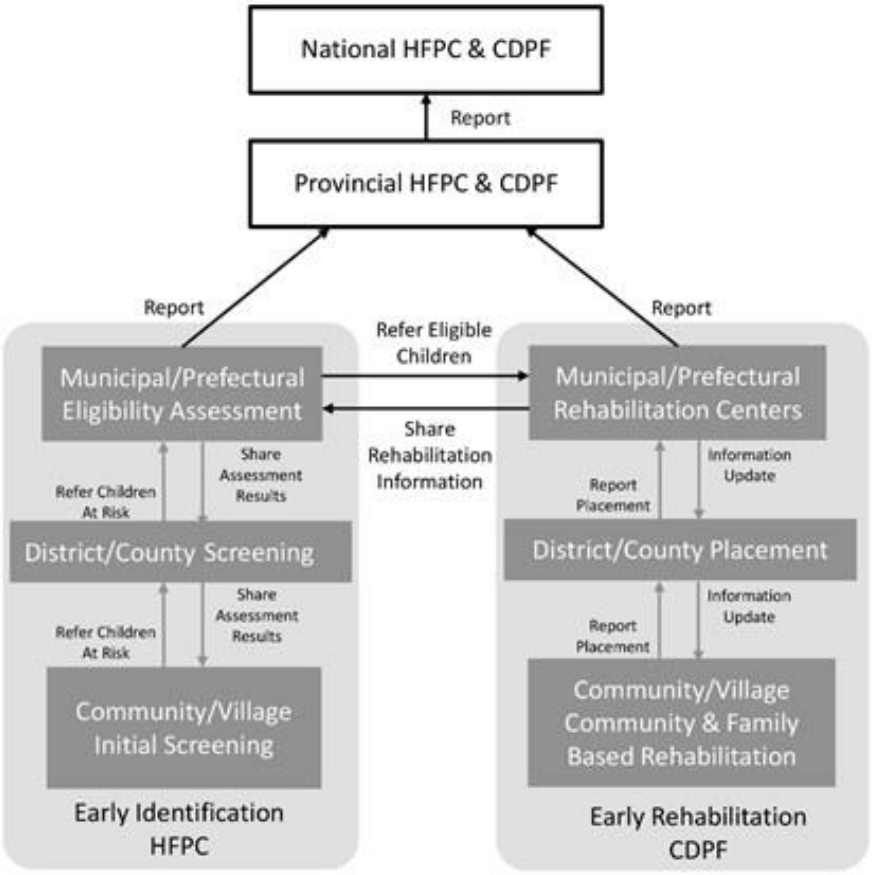


Figure 2. A disability detection and rehabilitation system for children zero to six. Adapted from "Procedural of Referral" by Chinese Center for Disease Control and Prevention, 2013, *Guidelines for disability screening on children from birth to six.* Retrieved from China Disabled Persons' Federation website http://www.cdpf.org.cn /special/0-6etsc/attache/2013-10/21/content_30453796.htm. Copyright 2013 by the Chinese Center for Disease Control and Prevention.

Assessment and referral system. Three types of assessment and referrals are described in the 2013 Guidelines. First, professionals at the community/village health care centers observe the child and interview the parents during child well checks to quickly identify concerns using the "Developmental Problem Indicators" (CCDCP, 2013 a), as well as physical check-up for possible hearing, vision and motor problems. Children who appear to meet any of the problem indicators or fail any physical check-up are to be referred for a secondary screening by the district/county level health care

providers using more comprehensive screening instruments. If the child continues to be at risk for developmental problems at the secondary screening, he/she will be referred to a municipal/prefectural assessment center, such as the department of developmental pediatrics of a children's hospital, for diagnostic assessments to determine eligiblity for rehabilitation services. Children who are found eligible will be referred to the rehabilitation system supervised by CDPF for rehabilitation and intervention services. However, no specific plan is described in the 2013 Guideline on when, how the "municipal/prefectural eligibility assessment centers" will be established or assigned.

Program evaluation. Results from assessment and rehabilitation services are reported in the hierarchical systems of the HFPC and CDPF, as well as shared across the two systems. HFPC and CDPF are responsible for identifying agencies and personnel who are not meeting the requirements and plan for adaptations. Effectiveness of the screening services is evaluated mainly on two indicators, *screening rate* and *referral rate* at the district/county level. *Screening rate* refers to the percentage of children who have been screened compared with the total numbers that should receive screening services. *Referral rate* is the percentage of children who have been referred for secondary screening assessments out of the total children screened who were identified.

Developmental Assessment Measures in China

The first attempt of developmental screening in China was a school readiness test for children ages four to seven in Shanghai (Guo, Gong, Tao & Li, 1981). As the new discipline of developmental pediatrics matures, more developmental screening measures have been disseminated for clinical use, most of which are translated from a foreign language such as English (Zhang, Fang & Huang, 1994). This section briefly reviews the

instruments required for developmental screening and eligibility determination assessments according to the 2013 Guidelines, as an outline of the recommended instruments in China.

Developmental Problem Indicators

For the initial screening for each of the five types of disability, the Developmental Problem Indicators (DPI) is required (CCDCP, 2013 a). The DPI consists of four problem indicators in each age interval, designed for infants and young children ages from two and a half months to 40 months. Since there are only four problem indicators in one screening assessment, the DPI can be administered by interviewing the parents or observing the child during a regular child well check-up visit. Children who meet any of the four problem indicators are referred for a secondary screening using more comprehensive screening measures and procedures. The reliability and validity of this instrument has not yet been examined.

Chinese Version of the Denver Development Screening Test

The Chinese Denver Development Screening Test (DDST) is one of the two measures required for the secondary screening for intellectual disabilities and physical disabilities if the DPI indicates concerns (CCDCP, 2013 a). It is a standardized, norm-referenced measure originally developed in English by Frankenburg and Dobbs in 1967. The Chinese version of the DDST was translated and adapted in 1982 by Lin and Li from Beijing Maternal and Child Health Care Hospital (Zhou et al., 2013). DDST requires trained professionals to collect information by directly observing the child as well as by interviewing the parents. Performance of a child is compared to the normative data to identify concerns in one or more areas including adaptive/fine motor, gross motor,

language, and personal-social (Liu, Chen, & Zhao, 2014). Regional normative data were collected in seven cities in China in the 1970's and 1980's. There is no current evidence supporting the reliability or validity of the Chinese DDST. A survey study in 1994 indicates that the DDST is widely used in China -- 123 child health care providers participated in the survey reported using it in practice (Zhang, Fang, & Huang, 1994). A study reported the average time for administering the Chinese DDST ranges from 10-20 minutes for one child (Zhou et al., 2013).

Mental Developmental Screening Test for Children

Another optional instrument for the secondary screening for intellectual and physical disabilities is the Mental Developmental Screening Test for Children (MDSTC, CCDCP, 2013 a). It is also a standardized, norm-referenced measure, which was developed in Chinese by Hua and his colleagues at Shanghai Children's Hospital of Fudan University in 1992. The MDSTC focuses on motor, adaptive and intellectual domains. Similar to the DDST, the MDSTC requires trained professionals to observe the child and interview the parents and interprets results by comparing assessment results to an established normative dataset (Liu, Chen, & Zhao, 2014). National normative data were collected in 1997 by Zheng and his colleagues. Evidence for reliability and validity of the MDSTC was also established in Zheng's study (1997). A second study that compared the Chinese DDST with MDSTC identified several strengths of the MDSTC, including a smaller false negative error, providing quantitative results, and better cultural responsivity (Yu et al., 1997). However, the MDSTC seems to be less commonly used than the DDST. Only eight child health care providers in the 1994 survey (Zhang et al.) reported using the MDSTC, compared to 123 using the DDST.

Modified-Checklist for Autism in Toddlers

The initial screening for possible characteristics of autism uses two indicators for referral decisions: any problem identified by the DPI, or any sign of regressive language or social development (CCDCP, 2013 a). For the secondary screening assessment, two measures are available, including the Chinese version of the Modified-Checklist for Autism in Toddlers (M-CHAT), which is recommended as the primary measure for secondary screening of children ages from 18 to 24 months (CCDCP, 2013 a). The M-CHAT is a criterion-referenced measure originally developed in English in 2001 as a simple screening tool completed by parents while waiting for a pediatric visit (Robin, Fein, Barton, & Green, 2001). It was translated and adapted to Chinese in 2011 (Gong et al., 2011). Gong and her colleagues (2011) also collected evidence for the reliability and validity of the Chinese M-CHAT on 178 children in Beijing, China.

Autism Behavior Checklist

Another choice for screening for autism is the Chinese version of the Autism Behavior Checklist (ABC), which was translated from the English ABC (Krug, 1978) in 1989 (Tao, 1999). It consists of 57 items and uses a cut off score to generate results (Krug, 1978), and can be used on children and adults ages from eight months to 28 years old, according to the 2013 Guidelines (CCDCP, 2013 a). Evidence for the reliability and validity of the ABC in the United States is reported in the English literature (Eaves & Williams Jr., 2006; Volkmar et al., 1988). Future research is needed to examine the validity of using ABC with a Chinese population.

Beijing Gesell Developmental Schedule

The 2013 Guidelines require using the Beijing GDS in the eligibility assessment

for diagnosing intellectual disabilities. This instrument was translated and adapted to Chinese in the 1970's from the original English version published by Knobloch and Pasamanick in 1974 (Lin, Li, & Zhang, 1986). The Beijing GDS was the diagnostic tool for intellectual disabilities in young children for the Second China National Sample Survey on Disability (CDPF, 2006). The Beijing GDS focuses on five developmental domains: adaptive behavior, gross motor, fine motor, language, and personal-social behavior. A child's developmental status is represented by the developmental quotient on the Beijing GDS, which is based on the child's chronological age and the age equivalents of the child's performance on test items. The Beijing GDS was standardized on 884 children in Beijing city in 1985 (Lin et al., 1986). Though widely used in China, the translation equivalence and test adequacy of the Beijing GDS has not yet been examined and documented. Updated normative evidence is also needed, especially as the Chinese population and child rearing practices have undergone many changes in the last 30 years.

Implications

The review of these five instruments required in the 2013 Guidelines (CCDCP, 2013 a) reflects some common features of developmental assessment measures in China. First, some assessment tools were developed many years ago. The context and knowledge of child development change over time, making it questionable to use assessment tools such as the DDST developed in 1967, the MDSTC developed in 1992, and the Beijing GDS developed in 1974. Second, many assessments are translated versions of English tools. The adequacy of such foreign tests needs to be examined in order to inform clinical practice. However, limited resources such as psychometric expertise, money, and time can be barriers for carrying out research on the adequacy and validity of a translated

instrument (Merenda, 2006). Third, the assessments have to be administered by trained professionals, as stated in the 2013 Guidelines for all five screening measures (CCDCP, 2013 a). Although oral consent from parents is required for referral, parent input and involvement in the assessment process has not yet been clearly stated. Finally, requiring the use of Beijing GDS as the only means to collect information of child development in eligibility assessment is questionable for two reasons: (1) the psychometric properties of the Beijing GDS have been criticized by Chinese researchers (Xu, Huang & Zhang, 2010), and (2) the resources and personnel for implementing standardized assessments such as the Beijing GDS are limited (Xu & Zhang, 2014; Jin, 2010; Luo et al, 2014). Instead, using more naturalistic tests including informed opinion and providing guidelines on how to yield rigorous informed opinion can be helpful, even necessary for eligibility determinations on infants and young children (Neisworth & Bagnato, 2011).

Cross-Cultural Adaptation of Assessment Instruments

Children develop in cultural contexts. Although there are commonalities in child development that exist across cultures, distinct cultural impacts also can be found in how a child performs a developmental skill and interacts with others, as well as in the point of time when specific skills emerge (Braga, 2007; Cohen & Kasen, 1999). Therefore, it is critical to examine the cultural appropriateness of developmental assessments translated and adapted for a different population in a different cultural and linguistic context.

Definition of Culture

The concept of culture typically refers to values, beliefs, knowledge, skills, and related behaviors pertaining to a group of people who share certain historical, geographic, linguistic, ethnic, racial, religious, or social background (Erickson, 2010). An instrument

that has been validated for its use in the United States may or may not have the same psychometric qualities in another country such as China. Furthermore, diversity exists among groups with different demographic characteristics in the same country, such as education, occupation, religion, values and beliefs in child development and parenting, socioeconomic status, opportunity, and geographic region. Examination of the test adequacy of a developmental screening process needs to take into account the specific factors in context, such as the purpose of assessment, population, personnel, and available resources for referral in the community (Salvia, Ysseldyke, & Bolt, 2013). Evidence on the cultural appropriateness and general test adequacy of a screening instrument can be helpful for professionals to make informed decisions in a specific context of practice.

Challenges in Cultural Adaptation

Cross-cultural adaptation of existing assessment tools includes multiple challenges (Hambelton et al., 2005; Pena, 2007; Merenda, 2006; Greenfield, 1997). First, merely translating an instrument from the original language to another does not support cultural appropriateness or test adequacy. For example, failure to make necessary cultural adaptations (e.g., converting between different temperature metric systems, use of materials not commonly found in another culture) may compromise the appropriateness of a translated instrument. Second, people from different cultures may respond differently to the instructions and questions in the translated instrument, due to multiple reasons such as a different understanding of a construct, or different preferences when completing a questionnaire. Third, inaccurate translation may cause misunderstanding for both the administrator and respondent, therefore resulting in the mis-measurement of a child's developmental status.

Considerations and Guidelines

Five aspects of translation equivalence. A comprehensive cross-cultural model is ideal for adapting and translating assessments for children and adolescents. One model examines an instrument for cultural equivalence in five dimensions: semantic, content, technical, conceptual, and criterion (Canino & Bravo, 1999). Semantic equivalence focuses on whether the meaning of each item is similar in both languages and cultures. Content equivalence can be achieved when the content of each item is meaningful and relevant in the culture in which the instrument is being used. Technical equivalence refers to the equity or validity of data collection methods in the assessment, such as use of parent report and a Likert scale. Conceptual equivalence measures whether the theoretical construct measured by a translated instrument is the same construct that the instrument was originally developed to measure. For example, the DDST was developed to measure developmental delay in four areas (i.e., adaptive/fine motor, gross motor, language, and personal-social), which are considered to be early indicators of intellectual disabilities (Liang, 2011; Zhang & Yu, 2012; CCDCP, 2013 a). Criterion equivalence is considered to be the most difficult part of the adaptation and translation process because it requires interpreting the results of a measure based on the occurrence of measured behaviors or traits in the pertinent culture. For example, the interpretation of a child's Chinese DDST score should be based on a normative sample of DDST scores collected on a stratified sample of children throughout China.

Guidelines for culturally responsive translation and adaptation. One significant effort to promote the quality of cross-cultural translation and adaptation of assessment instruments is the publication of *Guidelines for Translating and Adapting*

Educational and Psychological Tests by the International Test Commission (ITC). The first version of the *ITC Guidelines* was published in 1994 and an updated version in 2010 has been translated into 13 languages. The *ITC Guidelines* established the state of the art for translation and adaptation practices in four categories: context, test development and adaptation, administration, and documentation/score interpretations. For example, guidelines on test development and adaptation require evaluation of the fit between item content and stimulus materials and all intended populations (ITC, 2010). They also provide guidance on using statistical analysis to document and evaluate test equivalence between the original and the translated versions, as well as the validity of the translated instrument for the intended populations.

Introducing a Parent-Completed Screening Tool to China

In order to address the shortcomings in the Chinese developmental screening system described above, one developmental screening tool, the ASQ-3, has been translated into Simplified Chinese and a national Chinese normative sample was studied. The Chinese version of the ASQ-3, the ASQ-Chinese (ASQ-C) was published in 2013 (Squires & Bricker, 2009/2013). The translation and adaptation of the ASQ-C was conducted following the six steps based on the *ITC Guidelines*: translation, back translation, evaluation at the equivalence of the source and target versions, adaptation of culturally and linguistic inappropriate items, pilot testing and adapting, and establishing the Chinese sample to determine cut-off scores. As Bian, Xie and Squires reported (2014), the pilot test on 8,372 subjects in Shanghai metropolitan area was conducted in 2007 and 2008. Results and experiences from the pilot testing facilitated the standardization of the ASQ-C at the national level in 2011 - 2012. The ASQ-C sample

was stratified on the basis of age, sex, location status (rural/urban), ethnic group, parent education, and family annual income to represent the population of young children ages from 1 to 66 months in China. Research on the national sample resulted in good internal consistency (0.51 to 0.68) and good inter-rater reliability (0.79-0.89); a convergent validity study indicated 84% agreement between screening categorizations for the ASQ-C compared with the Beijing GDS. Most parents participated in the survey reported that the questionnaires were easy to understand and helpful to their parenting practices.

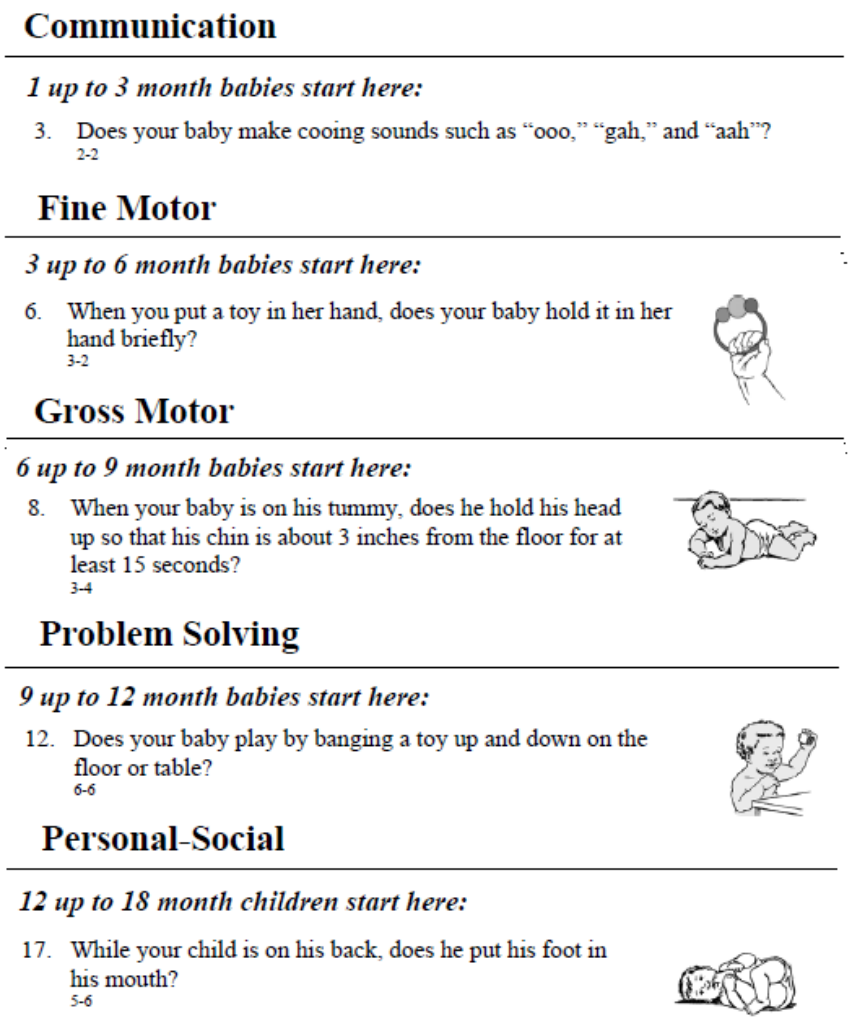
Within six months of publication in China, the ASQ-C was widely disseminated in over 50 child health organizations in 10 provincial regions. This popularity was due to the rigorous evidence for its validity, as well as the time-efficient features of the parent-completed design. As a member in the Chinese ASQ-C research team, I have been involved in multiple discussions regarding introducing another instrument for diagnostic assessments in the eligibility determination, one with similar features to the ASQ-C.

Ages & Stages Questionnaires: INVENTORY

English Version

By integrating all ASQ-3 items from the same developmental area across different age intervals into one scale, a more comprehensive assessment tool, the ASQ:INVENTORY was created. It provides a broader measure of the child's development, thus detecting a "floor" and a "ceiling" of a child's developmental repertoire for eligibility evaluations, rather than the limited sample of six developmentally targeted items found in the ASQ-3 (Clifford, 2006). The ASQ:INVENTORY focuses on five developmental domains: Communication, Gross Motor, Fine Motor, Problem Solving, and Personal-Social. Figure 3 presents selected

ASQ:INVENTORY items from the gross motor domain.



Communication

1 up to 3 month babies start here:

3. Does your baby make cooing sounds such as "ooo," "gah," and "aah"?
   2-2

Fine Motor

3 up to 6 month babies start here:

6. When you put a toy in her hand, does your baby hold it in her hand briefly?
   3-2

Gross Motor

6 up to 9 month babies start here:

8. When your baby is on his tummy, does he hold his head up so that his chin is about 3 inches from the floor for at least 15 seconds?
   3-4

Problem Solving

9 up to 12 month babies start here:

12. Does your baby play by banging a toy up and down on the floor or table?
    6-6

Personal-Social

12 up to 18 month children start here:

17. While your child is on his back, does he put his foot in his mouth?
    5-6

Figure 3. Selected items from the Ages & Stages: Questionnaires: INVENTORY. From *Ages & Stages Questionnaires: INVENTORY Pilot Version 2.3 2011*, by Squires, J., Bricker, D., & Clifford, J., in process, Baltimore, MD: Brookes Publishing.

For this study the primary purpose of the ASQ:INVENTORY was to guide informed opinion in eligibility determination, to examine its potential use in a context where standardized assessments are not appropriate or available. Scores from the five domains in the ASQ:INVENTORY can be transferred to standard scores or a percentile rank to characterize a child's performance relative to an external reference group. One type of standard scorere is the *z* score, which has a mean of zero and a standard deviation

of one (Salvia et al.,2013). Using the *z* score to identify how a child performed on the test comparing to other children of a similar age, the ASQ:INVENTORY may be useful for determining eligibility for services.

In addition, the ASQ:INVENTORY can also be used for a follow up assessment on children whose initial screening results indicated concerns, in a context where standardized assessments are available but resources (e.g., qualified personnel) are limited. Conducting a follow up assessment with the ASQ:INVENTORY may enhance the efficiency of eligibility evaluation by increasing the accuracy of referral of children who indeed need intervention services for standardized assessments.

Clifford (2006) examined the use of the ASQ:INVENTORY as a developmental measure for use with toddlers ages 18 to 36 months in the U.S. Findings provided solid evidence for the inter-rater reliability between parents and a professional (i.e., a trained research assistant), the concurrent validity with the Battelle Developmental INVENTORY, Second Edition (BDI-2), the convergent validity with clinical diagnoses, and adequate item fit using the item response theory. Results from a utility study also suggested that parents found the ASQ:INVENTORY easy to complete, were more likely to report benefits than drawbacks from the assessment, and that the expense for administering the ASQ:INVENTORY was three to four times less than using a standardized, professionally administered assessment such as the BDI-2. Findings from another study confirmed the concurrent validity of the ASQ:INVENTORY using the BDI-2 as the concurrent measure and the adequacy of item difficulty (Bae, 2007). In addition, Bae's study (2007) provided evidence for the test-retest reliability of the ASQ:INVENTORY. Further research is needed to examine the psychometric adequacy

of using the ASQ:INVENTORY to inform eligibility decisions in China.

Simplified Chinese Version of ASQ:INVENTORY

The items from the previously adapted ASQ-C (Squires & Bricker, 2009/2013) were used to develop the Chinese ASQ:INVENTORY, using the item order and format from the English ASQ:INVENTORY (Edition 2.3 2011, Clifford, 2009). The same scoring procedures were adopted from the English ASQ:INVENTORY.

Adapting and validating the ASQ:INVENTORY in Chinese are expected to contribute to children, families, practitioners and researchers in both the U.S and China by studying an economical and unique method for developmental assessment with one tool. In the U.S., a validated Simplified Chinese version of the ASQ:INVENTORY can be used for assessing and monitoring child development. In China, the multiple purposes of the ASQ:INVENTORY – screening and eligibility determination – provide promising assessment alternatives.

Domains of development. The five developmental domains in the ASQ:INVENTORY (i.e., communication, gross motor, fine motor, problem solving and personal-social) seem to better represent comprehensive development in early childhood than the four domains in the Chinese DDST (i.e., adaptive/fine motor, gross motor, language, and personal-social) by including a problem solving domain. Assessing a child's problem solving skills (e.g., "*After a crumb or a Cheerio is dropped into a small, clear bottle, does your child turn the bottle upside down to dump it out?*") provides information about the child's cognitive development, which is required in the assessment of intellectual disability and autism spectrum disorder according to the 2013 Guidelines (CCDCP, 2013 a) and the Law on Protection of Persons with Disabilities (State Council,

2008).

Screening. In the disability detection system (see Figure 2) described in the 2013 Guidelines (CCDCP, 2013 a), the Chinese ASQ:INVENTORY can be used for secondary screening at the district/county level. Assessing developmental skills across a wide age range (from 1 to 66 months), the ASQ:INVENTORY can provide more comprehensive information about a child's development than many instruments designed for brief screening such as the ASQ-C and the Chinese DDST. Given the popularity of the ASQ-C in China, using the ASQ:INVENTORY for a follow up assessment may be especially efficient when an initial screening was completed with the ASQ-C. Assessment with the ASQ:INVENTORY can build on information gathered from the completed ASQ-C from the initial screening to save time. Percentile scores and *z* scores generated from the ASQ:INVENTORY using a normative sample can be used to either confirm or reject the need for eligibility evaluation.

For example, Lin Yan, a 27-month old child who scored below or close to the ASQ-C cutoff in two domains in the initial screening assessment at the community/village level was referred for a secondary screening at the district/county level. Lin obtained percentile scores above the 15th percentile in all five domains on the Chinese ASQ:INVENTORY. According to the local early intervention policy, children who scored below one percentile in any developmental domain are considered eligible for specialized services. It was indicated that Lin's delay was not significant enough, so she was not referred to the municipal/prefectural assessment center for eligibility evaluation. However, Lin may be rescreened using the ASQ:INVENTORY for progress monitoring in four to six months or sooner (e.g., one to two months). Meanwhile, individualized

learning activities will be provided to her parents to support her development in both domains where the ASQ-C results indicated potential concern. During the rescreening, ASQ-C protocols from the initial screening can be reviewed to help with identifying the most developmentally appropriate and efficient points to start the assessment.

Eligibility determination. The ASQ:INVENTORY can also be used to facilitate eligibility decisions at the municipal/prefectural level (see Figure 2), especially in areas where limited resources make it difficult to implement the Beijing GDS as recommended in the 2013 Guidelines (CCDCP, 2013 a). For example, Gina, a 12 month old girl scored 31 in the ASQ:INVENTORY communication domain. We can assume that Gina's score equals a *z* score of -1.8 based on a reference group of children at the same age. This *z* score indicates that Gina's performance on the ASQ:INVENTORY communication domain is 1.8 standard deviations below the mean of her same age peers, and can inform decisions on Gina's eligibility based on the eligibility criteria or capacity of services in her community. If the eligibility criteria include "a child who shows a delay of 1.5 standard deviations or more in at least one developmental domain is eligible for services", her *z* score of -1.8 indicates that Gina is eligible for services. Eligibility may also be determined based on the capacity of services -- for example, 1% of all children under six years old may be eligible for services related to communication delay. In this case, Gina's *z* score of -1.8 can be transferred to the fourth percentile, which means that Gina's performance in communication is better than or equal to 4% of her same age peers. Based on the 1% capacity, Gina may not be eligible for services for communication delay.

Compared to the Beijing GDS, the ASQ:INVENTORY has six advantages. First,

the ASQ:INVENTORY has updated items. The ASQ:INVENTORY items are integrated from the ASQ-C which were recently updated in 2009, while the Beijing GDS is based on the 1974 version. Also, the ASQ-3 items are in process of being updated and simplified. Once the new ASQ-4 edition is published, the ASQ:INVENTORY will be updated with the same items. Second, the ASQ:INVENTORY has evidence that suggests it yields valid and reliable scores. The Beijing GDS provides developmental quotients calculated with developmental equivalents and a child's chronological age (Lin et al., 1986), which have been criticized as "problematic" therefore "should never be used" (Salvia et al., 2013, p. 42-44 & 47). The ASQ:INVENTORY results are expressed in standard and percentile scores that provide more accurate and helpful information about a child's development. Third, documented translation quality is high quality. The ASQ:INVENTORY items are adopted from the ASQ-C, which was translated and adapted following the six steps in the ITC Guidelines (ITC, 2010) and the evidence for translation equivalence has been reported (Bian et al., 2014). Currently, no evidence for the translation equivalence of the Beijing GDS is reported in the literature. Fourth, the ASQ:INVENTORY is a naturalistic assessment. The Beijing GDS requires direct testing of the child by professionals using standardized materials and instructions, while the ASQ:INVENTORY allows collecting information by interviewing the parents, observing and interacting with the child in natural settings. Fifth, the requirements of personnel for administering the ASQ:INVENTORY are more flexible. The Beijing GDS requires qualified physicians, while the ASQ:INVENTORY can be administered by a variety of practitioners including but not limited to physicians, nurses, medical assistants, social workers, and child care providers. Sixth, the ASQ:INVENTORY takes potentially less

administration time. The completion of the Beijing BDS is reported to take 40 to 120 minutes (Liang & Zhu, in process), while the ASQ:INVENTORY takes 20 to 60 minutes when administered by parents (Clifford, 2006). Table 2 compares features of the Chinese DDST, Beijing GDS, and the ASQ:INVENTORY.

Table 2. *Chinese Denver Development Screening Test, Beijing Gesell Developmental Schedule, and Ages & Stages Questionnaires: INVENTORY*

Features	Denver Development Screening Test	Beijing Gesell Developmental Schedule	Ages & Stages Questionnaires: INVENTORY
Year of item development/ refinement	1967	1974	2009
Domains	adaptive/fine motor, gross motor, language, personal-social	adaptive behavior, gross motor, fine motor, language, personal-social	communication, gross motor, fine motor, problem solving, personal-social
Normative data	regional data collected from 1970's to 1980's	regional data collected in 1985	regional data were collected in 2015-2016
Standardize requirements	standardized materials, instructions, procedures	standardized materials, instructions, procedures	interview parents and observe child in natural settings
Types of scores	developmental equivalents, developmental quotients	developmental equivalents, developmental quotients	standard scores, percentile scores
Personnel requirements	trained professionals	qualified physicians	trained professionals
Translation quality	not found in current literature	not found in current literature	Bian et al., 2014
Psychometric properties of Chinese version	not found in current literature	not found in current literature	Chen, 2013 (traditional Chinese version); the Simplified version is examined in this study
Time	10-20 minutes	40-120 minutes	15-70 minutes

Research Purpose

In conclusion, the adaptation of a valid and reliable instrument is critical for developmental screening and indication of eligibility status in China. The psychometric properties of the ASQ:INVENTORY address needed requirements for assessing young children. The five domains assessed by the ASQ:INVENTORY align with the requirements in the Chinese legislation and the common understanding of early childhood development in the Chinese literature. Considering its limited resources, the ASQ:INVENTORY is a promising instrument for China and elsewhere. The ASQ:INVENTORY yields results that are accurate (i.e., as standard scores and percentile scores) and authentic (i.e., collecting information about the child's natural performance in multiple settings) in the U.S. Additionally, the naturalistic formats of administration (e.g., interview with parents, observing and interacting with the child with assistance from parents) of the ASQ:INVENTORY promote professional-parent collaboration throughout the assessment. Therefore, this study aimed to adapt the English ASQ:INVENTORY to Simplified Chinese and investigate its psychometric properties, cultural equivalence, and utility in the context of developmental pediatric practices in China.

CHAPTER III

METHOD OF STUDY

The ASQ:INVENTORY is a newly developed assessment with preliminary evidence supporting its psychometric properties, including reliability and validity (Clifford, 2006; Bae, 2007; Chen, 2013). This study focused on the test adequacy of a Chinese adaptation of the ASQ:INVENTORY, examining item functioning, reliability, validity, and utility. In addition, response patterns on the original English and translated version were compared to inform cross-cultural research. The translation, standardization, validation and publication of the Chinese version of the ASQ-3 (Bian, Yao, Squires, Hoselton, Chen & Murphy, 2012), the ASQ-Chinese (ASQ-C) provided a solid foundation for the development and testing of the Chinese ASQ:INVENTORY.

A psychometric, non-experimental design was applied using both quantitative and qualitative methods of inquiry. Research questions included:

1. Do the Chinese ASQ:INVENTORY test items and the order in which they were arranged reflect the hierarchy of child development in China?

2. Does the Chinese ASQ:INVENTORY yield consistent assessment results?

    2.1. What is the internal consistency?

    2.2. What is the test-retest reliability?

3. How accurate is the Chinese ASQ:INVENTORY in measuring child development?

    3.1. What is the concurrent validity with the Beijing Gesell Developmental Schedule (Beijing GDS)?

    3.2. What is the known-group validity between children with an

established disability and those without?

3.3. What is the sensitivity and specificity of the screening results using the Chinese ASQ:INVENTORY?

4. Are there differences in the responses in China and the U.S.? If so, how are they different?

5. How do pediatricians and caregivers/parents in China perceive the usefulness of the Chinese ASQ:INVENTORY?

Participants

For this preliminary study, participants were recruited from three different groups: children ages from one to 25 months, their caregivers (e.g., parents), and pediatricians working in Kunshan, a city of 1.6 million on the east coast of China. The child sample was stratified by gender (i.e., female and male), and ethnicity (i.e., the majority Han ethnic group and other minor ethnic groups), based on the most recent Kunshan census data (City Bureau of Statistics of Kunshan, 2014).

This study obtained research approvals prior to its commencement from the Institutional Review Board at the University of Oregon and the ethical census in China. All data were collected after a written consent was obtained from participants, including the parents/caregivers of child participants. Table 3 provides a list of the child participants and the sample size in two countries.

Children and Caregivers in China

Child participants were recruited using the inclusion criteria: (1) one to 25 months of age, (2) at least one of the biological parents is Chinese, and (3) the primary language used at home is Chinese. The sample included at least 20 children in each of the 12 ASQ-

3 age intervals (i.e., 2-, 4-, 6-, 8-, 10-, 12-, 14-, 16-, 18-, 20-, 22-, and 24-month).

Two sub-groups were recruited from Chinese children for examining known-groups validity: a sub-group (n = 38) with existing diagnoses of disability, and another sub-group (n = 44) who were identified as typically developing by child care providers. In order to control the impacts from age on their assessment results, the known-groups sample was collected from children ages 17-20 months. For similar reasons, the Beijing GDS data were collected on children ages 11-12 months (n = 53).

Table 3. *Number of Child Participants by Country and ASQ:INVENTORY Domain*

Domain	Country					
	China (Simplified Chinese)			United States (English)		
	Typical	With special needs	Unknown/ Missing	Typical	With special needs	Unknown/ Missing
CM	44	63	705	180	16	245
GM	44	63	703	212	22	267
FM	44	63	705	211	1	51
CG	44	63	705	210	3	38
PS	44	63	722	206	4	131

Note. CM = Communication, GM = Gross Motor, FM = Fine Motor, CG = Problem Solving, PS = Personal-Social.

Caregivers of the participating children were invited to participate in a utility survey. Caregivers included the child's parents and grandparents, spend at least 20 hours per week with the child (Squires & Bricker, 2009). No additional inclusion criteria were used to select caregiver participants.

Children in the U.S.

For a cross-cultural comparison, a retrospective sample of American children were selected from data bases from previous and current studies of the

ASQ:INVENTORY in the U.S, conducted from 2012 to 2015. The inclusion criteria for the U.S. sample were: (1) one to 25 months of age, (2) U.S. citizen or permanent resident, and (c) English as the primary language used at home.

Pediatricians

In a previous study on the ASQ:INVENTORY in the U.S., parents completed the ASQ:INVENTORY questionnaires following written instructions (Clifford, 2006). In this study, ASQ:INVENTORY data on the Chinese sample were collected by pediatricians collaborating with caregivers. There were two reasons for using pediatricians as the data collectors. First, the "basal and ceiling" rules in the assessment process might be confusing for Chinese caregivers who had no experience with developmental assessment. Second, a pilot interview of Chinese pediatricians indicated that they also had limited training and experience in using a comprehensive developmental assessment measure as the ASQ:INVENTORY. It could be educative for both pediatricians and caregivers to collaboratively complete the assessment.

The pediatricians who used the ASQ:INVENTORY for this study were recruited from child health care settings in Kunshan. Two inclusion criteria for pediatricians included: (1) the pediatrician is regularly using or recently used developmental assessments on infants and young children under the age of three, and (2) the pediatrician has administered the ASQ:INVENTORY with at least 10 children. The ASQ-C research team was consulted for the selection and recruitment of pediatricians.

Settings

Within the Kunshan child health care system, four child health care entities participated, including maternal and child health clinics and community health centers in

different regions of the city. The director of the Kunshan child health care system was contacted to obtain an agreement to participate and to select the settings that best represent the socioeconomic development and regional characteristics of the city. Once pediatricians and caregivers gave consent to participate, pediatricians completed the assessment in a clinical office with the assistance from caregivers, who also filled out research forms in the same setting.

Measures

Measures used for collecting data included: (1) Chinese and English demographic forms for children and caregivers, (2) the Chinese and English versions of the ASQ: INVENTORY, (3) the ASQ-C, (4) the Beijing GDS, (5) utility questionnaire for Chinese caregivers, and; (6) pediatrician interview scripts. Table 4 lists the measures and participants.

Table 4. *Measures Completed by Participants*

Instruments	Participants
1. Demographic form for children and caregivers (Chinese and English versions)	Chinese caregivers & American caregivers
2. ASQ:INVENTORY (Chinese and English versions)	Chinese caregivers & American caregivers
3. ASQ-C	Chinese caregivers
4. Beijing GDS	Chinese caregivers
5. Utility survey	Chinese caregivers
6. Interview script	Pediatricians

Note. ASQ-C = Ages & Stages Questionnaires-Chinese; ASQ:INVENTORY = Ages & Stages Questionnaires: INVENTORY; Beijing GDS = Beijing Gesell Developmental Schedule.

Demographic Form

Caregivers of participating children were asked to provide background information about their child, family and themselves. Children's date of birth, premature status (e.g., whether born three weeks earlier than expected), gender, disability status, and early intervention or rehabilitation services received (if applicable) were included. Questions pertaining to caregivers and families included their relationship to the child, education level, ethnicity, mother's age at child's birth, primary care giver at home, family registration status (i.e., urban or rural), and annual family income.

Ages & Stages Questionnaires - Chinese

The Ages & Stages Questionnaires - Chinese (ASQ-C) is a Chinese version of the ASQ-3, a parent-completed instrument for brief, quick and easy screening assessments. Each of the five domains (i.e., communication, gross motor, fine motor, problem solving, and personal-social) has six questions. Questions receive scores of 10, five and zero depending on whether the child is performing the activity regularly, just beginning, or is not yet performing. The total scores of each domain are compared to the cutoff scores derived from a Chinese normative sample to identify whether the child needs to be referred for further assessment. The translation equivalence of the ASQ-C has been supported by the findings of a study on 8,472 children in Shanghai, China (Bian et al., 2012). A national study on 4,452 children from six regions in China indicated solid reliability and validity for the Chinese ASQ-C (Bian, Xie, & Squires, 2014).

Ages & Stages Questionnaires: INVENTORY

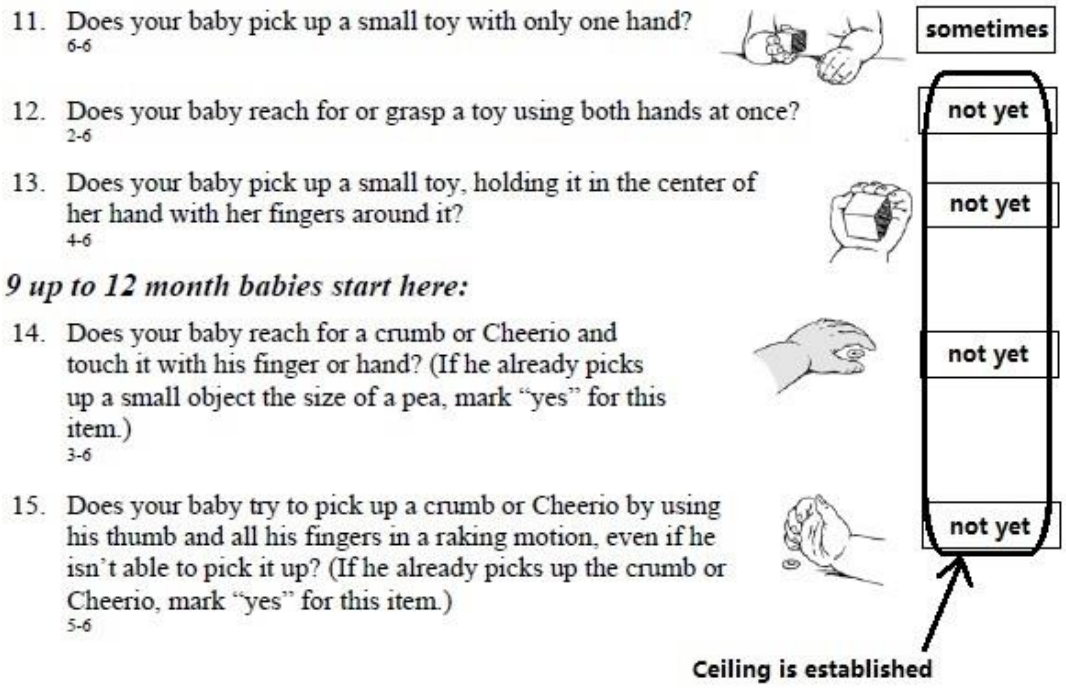
English and Chinese versions of the ASQ:INVENTORY (see Appendix A) were used to collect data on children's skills and to compare English and Chinese data.

Retrospective data from previous studies of the English ASQ:INVENTORY were selected and compared with Chinese data.

The ASQ:INVENTORY is a developmental measure for children ages from one to 36 months. The ASQ:INVENTORY includes 63 to 68 items in each of the five domains (i.e., communication, gross motor, fine motor, problem solving, and personal-social) of the ASQ:INVENTORY. A basal and ceiling rule is enforced to reduce the number of test items for children, as well as the time for administration. Administrators start the assessment based on the child's age in months and corresponding starting points at the child's age. When four consecutive items receive a "yes" score, a basal is established. Failure to establish a basal requires administering the items in a reverse order until a basal is established with earlier items. Four consecutive items receiving "not yet" serve as the ceiling; items after this receive a score of zero. Figure 4 provides an example of ceiling in the fine motor domain. Scores of each domain are summed into a total score; children's scores were converted into a percentage of the domain total.

The current study used a paper-pencil format of the Chinese ASQ:INVENTORY for pediatricians to administer. Questions were answered using primarily an interview form with the parent, as well as from clinical observations of and interactions with the child, with parental assistance.

Figure 4. Four consecutive responses of "not yet" establish the ceiling in the Communication domain. From *Ages & Stages Questionnaires: INVENTORY Pilot Version 2.3 2011*, by Squires, J., Bricker, D., & Clifford, J., in process, Baltimore, MD: Brookes Publishing.



Cultural adaptation. The Chinese ASQ:INVENTORY contains the entire item pool from the ASQ-C, which has been examined for cultural equivalence and appropriateness on the Chinese population (Bian et al., 2012). In addition to the ASQ-C items, there are 65 new items in the ASQ:INVENTORY, designed to represent the upper range of child development (e.g., a typical development of 36 months and older, and younger children whose development is advanced). The additional items were translated by the principal researcher who is proficient in both English and Chinese. A back-translation procedure as recommended in the ITC Guidelines (ITC, 2010) was adopted to examine the equivalence of the two language version. The translation and back-translation procedures resulted in 29 out of the 65 new items being adapted in three ways. Table 5 shows three types of cultural adaptation, number of items adapted, and an example for each type.

Table 5. *Types of Cultural Adaptation of the New Items in ASQ:INVENTORY*

Type of adaptation	Number of items	Example
Adaptation of the measurement system	10	Item 51 in Gross Motor domain, "Does your child hop on one foot for a distance of 2 feet?" was translated as "孩子能单脚不停跳着前进至少60厘米的距离吗 (Does your child hop on one foot for a distance of 60 centimeters)"?
Adaptation of the examples	13	Item 56 in Fine Motor domain, "Does your child cut up soft food into smaller pieces using a dull knife? For example, can your child use a butter knife to cut bananas or mangos?" was translated as "孩子能用一把钝刀切东西吗？例如，用塑料刀切橡皮泥，或用餐刀切香蕉或芒果 (Does your child cut up soft food into smaller pieces using a dull knife? For example, can your child use a plastic toy knife to cut playdough, or use a butter knife to cut bananas or mangos)"?
Adaptation of the targeted skill	16	Item 47 in Communication domain, "Does your child make her voice go high at the end of a sentence that is a question?" was translated as "孩子会在问句结尾使用"吗"或"啊"表示提问吗？(Does your child use the correct particle such as "ma" or "a" at the end of a sentence that is a question)"?

Beijing Gesell Developmental Schedule

In order to examine the concurrent validity of the Chinese ASQ:INVENTORY, a Chinese version of the Beijing Gesell Developmental Schedule (Beijing GDS) was used as a criterion measure to determine a child's disability status. The Beijing GDS is an individually administered standardized, norm-referenced assessment for children from birth through six years that is commonly used for eligibility decisions in China (Liu, Chen, & Zhao, 2014). The assessment includes more than 500 items in five developmental domains: adaptive behavior, gross motor, fine motor, language, and personal-social behavior and requires trained professionals using clinical observation and

caregiver interviews. Typical administration time is reported between 40 to 120 minutes (Liang & Zhu, in process). Items in each domain are assigned an age equivalent based on normative data; a child's performance on each item is scored as "pass" or "no pass", and domain age equivalent score is determined by calculating the number of "pass" items at each age interval. A developmental quotient (DQ) score is derived by dividing an age equivalent by the child's chronological age times 100. In China, a Beijing GDS DQ under 40 indicates severe developmental or intellectual impairments; DQ from 40 to 54 indicates moderate impairments; DQ between 55 to 74 indicates mild impairments; DQ above 75 is considered typical (Liang, in process). Eligibility for intellectual disabilities requires a DQ at or below 75 (Chinese Center for Disease Control and Prevention, 2013).

As described above, the psychometric properties of the Beijing GDS have not been reported for young children under three years old in China. However, it was selected by a panel of experts from the China Disabled Persons' Federation (CDPF) as the only diagnostic assessment instrument for the Second China National Sample Survey on Disability (CDPF, 2006), and has been recommended by the CDPF and State Health Bureau as the "gold standard" for diagnosing intellectual disabilities on children from birth to six (Chinese Center for Disease Control and Prevention, 2013). In this study, the Beijing GDS was used because it is the only sanctioned measure, and was administered by trained pediatricians.

Utility Survey

A six-question utility questionnaire (see Appendix A, Utility Parent Survey) was developed to survey the parents/caregivers about their experience of using the ASQ:INVENTORY. Parents were asked to estimate how long it took to complete the

ASQ:INVENTORY on their child, if the parent had experiences with other developmental assessment tools, and if they did, to compare the experiences with the ASQ:INVENTORY and the other tools. Question three, four, five and six used a five-point Likert scale for parents to rate how much the ASQ:INVENTORY assessment procedure helped them better understand their child's development, whether the skills and behaviors measured on the ASQ:INVENTORY were pivotal and developmentally appropriate for their child, whether they felt respected and involved in the assessment process, and whether they would recommend the ASQ:INVENTORY to other parents who have concerns about their child's development.

Pediatrician Interview

A script (see Appendix A, Interview Script) was developed for conducting semi-structured interviews with the pediatricians who collected data on the Chinese ASQ:INVENTORY in this study. The goal of the interview was to examine to what extent the ASQ:INVENTORY met the needs for early childhood developmental assessment in China. The script contained a demographic section about the pediatrician's professional background, such as their academic degree and major, hospital/clinic for practice, and how many years they have been providing child health care and developmental assessment services. In the second section of the interview, the pediatricians were asked to report the approximate length of assessment using the ASQ:INVENTORY, and to compare the ASQ:INVENTORY with other developmental assessment tools they used in practice. In addition, four open-ended questions asked the pediatricians to evaluate whether ASQ:INVENTORY targeted most critical skills and behaviors in child development, to reflect on the format of the protocols and the

administration process, and to comment on the utility of the ASQ;INVENTORY assessment results in informing screening and diagnostic decisions in their practice. At the end of the interview, pediatricians were asked for additional comments on their experiences with the ASQ:INVENTORY.

Procedures

Recruitment of Participants

Sites and pediatricians. Approval for research with human research participants from the University of Oregon and China was obtained in August, 2015 before the recruitment procedure started. Once the approvals were obtained, an invitation was sent to the director of the child health system in Kunshan. The director distributed a pediatrician recruitment announcement by emails, telephone calls, WeChat messages (specific to China), and face-to-face contacts to pediatricians in four child health care settings. Details about the study were sent by email to those who expressed an interest. In addition, recruitment announcements were posted on the electronic management systems in the health care settings.

Once pediatricians agreed to participate, they were provided a 15-hour training conducted in 3 days. The content of the training included the administration procedure of the assessments (i.e., how to describe the study to parents/caregivers, how to conduct parent interview, child observation and testing), as well as protection of confidentiality pertaining to this study. At the end of the training, the 16 pediatricians rated the same on 88% to 95% items across five domains of the ASQ:INVENTORY.

Children and caregivers. Child and parent recruitment flyers and consent forms were printed and placed at pediatric clinics for distribution during patient check-ins. A

systematic sample with a random start (Babbie, 2012) was used to recruit child and caregiver participants from child health care settings following these inclusion criteria: ages from 1-25 months, with at least one parent has Chinese citizenship, and using Chinese as the primary home language. At each data collection site, a random number from one to 10 was selected to indicate when to start sampling. For example, a randomly generated number of 4 indicates the fourth visitor to the site was the first to be asked to participate in the study. Potential participants were selected systematically on a sampling interval of five, which means one in every five visitors was asked to participate. For example, the fourth, the ninth and then the fourteenth visitors were asked to participate. The recruitment of parents in the utility survey was conducted based on parents' self-selection. All parents whose children participated in the study were given a choice to complete the utility survey.

Potential participants were offered a free developmental screening assessment on their children at designated hospitals or clinics. After the first assessment using the ASQ:INVENTORY, caregivers who indicated an interest in participating in follow up assessments using the Beijing GDS (for concurrent validity study) and/or using the ASQ:INVENTORY (for test-retest reliability study) were contacted for a second visit.

Data Collection

Regional normative sample. The Chinese ASQ:INVENTORY was used to collect a regional normative sample in Kunshan. Once a caregiver gave consent, a trained pediatrician administered the ASQ:INVENTORY collaborating with the caregiver. During the assessment, the caregiver observed and assisted with directing their child's attention to the targeted tasks, giving directions to the child. Parents reported information

about the child's performance in their daily lives. The questionnaires were completed by the joint efforts of pediatricians and caregivers. It was thought that because most Chinese parents had little or no experience with developmental assessment, independent completion would be difficult, including the "basal and ceiling rules" that might be confusing to caregivers. The caregiver also completed a demographic form, the ASQ-C, and/or the caregiver utility survey on site. Completed forms at each site were collected by a research assistant, who entered the collected data to an electronic database developed by the principal researcher. After the assessment, each caregiver received a $10 gift card as the incentive for participation.

Preliminary psychometric examination. For research questions 2 and 3, a second appointment was scheduled with caregivers who met the inclusion criteria and indicated an interest in participating in the follow-up assessments. After obtaining consent from the caregiver, the pediatrician administered either the Beijing GDS or the ASQ:INVENTORY (for retest data) based on the selection of the caregiver. The caregiver received a $10 gift card again, for this second appointment.

For the sub-group of children aged from 17 to 20 months with identified disabilities, who were recruited for known-groups validity study, data were collected by either phone conversation with their parents (n = 25), or face-to-face meetings with the child and parents in clinical settings (n = 13). Children who lived far away from the child health clinics or those whose parents did not want to take their child to the public were assessed by phone interview of their parents with the pediatrician.

Cross-cultural comparison. For research question 4 related to differences in response patterns, extant ASQ:INVENTORY data from American children from previous

and current studies in the U.S. were used. Demographic information was examined to ensure the inclusion criteria were met.

Utility evaluation. In order to investigate the perceived usefulness of the Chinese ASQ:INVENTORY, quantitative and qualitative data were collected by surveys with caregivers and interviews with pediatricians. Quantitative data were collected using a Likert-type scale on the utility survey completed by caregivers after their children's ASQ:INVENTORY assessment, as described above.

Qualitative data were collected from interviews with pediatricians. After pediatricians completed and submitted the children's data to the research assistant, the principal researcher scheduled and conducted the interviews one-on-one with each pediatrician who signed up for the interview. Formats of interview included international phone calls and online video-conferencing, depending on the pediatrician's selection. Each interview took 15 to 25 minutes to complete.

All original data were stored in a locked cabinet accessible to the research assistant only. All forms were identified by identification numbers only in any format of reports. Electronic data were stored with passwords on a computer, to which only the principal researcher had access.

Data Analysis

This section describes the data analyses for each research question. Methods for data analysis included IRT modeling, differential item functioning (DIF), ANCOVA, correlational analyses, descriptive statistics, and qualitative interpretation of anecdotal notes and interview transcripts. Table 6 presents the research questions, outcome measures, and analytical methods that was used to address the questions in this study.

Table 6. *Research Questions, Outcome Measures, and Analytical Methods*

Research Question	Measures	Analytical Methods
1. Do the Chinese ASQ:INVENTORY test items and the order in which they were arranged reflect the hierarchy of child development in China?	Chinese ASQ:INVENTORY	Descriptive statistics, IRT Rasch one-parameter partial credit model
2. Does the Chinese ASQ:INVENTORY yield consistent assessment results?		
• Internal consistency	Chinese ASQ:INVENTORY	Cronbach's Alpha, Pearson's product-moment correlation coefficient
• Test-retest reliability	Chinese ASQ:INVENTORY	Pearson's product-moment correlation coefficient
3. How accurate is the Chinese ASQ:INVENTORY in measuring child development?		
• Concurrent validity	Beijing GDS	Pearson product-moment correlation coefficient
• Known-groups validity	ASQ-C, Reported disability status	ANCOVA, descriptive statistics
• Sensitivity and specificity	ASQ-C, Reported disability status	Descriptive statistics

Table 6. *(continued)*

Research Question	Measures	Analytical Methods
4. Are there differences in the responses across China and the U.S.? On which items do differences occur?	Chinese and English ASQ:INVENTORY,	Independent t-test, Descriptive statistics, DIF
5. How do pediatricians and caregivers perceive the usefulness of the Chinese ASQ:INVENTORY?	Utility questionnaires, interview script	Descriptive statistics, qualitative analysis

Note. ASQ-C = Ages & Stages Questionnaires-Chinese; ASQ:INVENTORY = Ages & Stages Questionnaires: INVENTORY; DIF = differential item functioning.

Research Question 1, Item Order

Both classical test theory (CTT) models and item response theory (IRT) models were used to examine whether the ASQ:INVENTORY test items reflect the hierarchy of child development in China. Using a quantile regression approach in CTT, percentile scores (i.e., 10^{th}-, 25^{th}-, 50^{th}-, 75^{th}-, and 90^{th}-percentile) were calculated for each age interval across five domains. Corresponding percentile scores across age (e.g., 10^{th}-percentile scores from 2-, 4-, 6-, 8-, 10-, 12-, 14-, 16-, 18-, 20-, 22-, and 24-month) were graphed with trend lines.

In order to examine whether the order of the items reflects the hierarchy of child development in China, the ASQ:INVENTORY domain scores (i.e., Communication, Gross Motor, Fine Motor, Problem Solving, and Personal-Social) were analyzed to interpret patterns of response, based on the estimated person ability and item characteristics. This analysis used IRT modeling, a latent trait measurement based on the assumption that a person's ability and item difficulty predict the response pattern (Embretson & Reise, 2000). In regard to the ASQ:INVENTORY, a "yes" response to a

difficult item requires a higher level of competence of a child, compared to the same "yes" response to an easier item. According to the polytomous scoring feature of the ASQ:INVENTORY (i.e., three possible scores for each item, different items may have different category thresholds), a Rasch one-parameter partial credit model was used for all IRT analyses in this study, as has been used in previous studies of the ASQ:INVENTORY (Clifford, 2006; Chen, 2013). Analyses were conducted using ConQuest 4.4 (Adams, Wu, & Wilson, 2015).

Research Question 2, Reliability

Domain scores on the ASQ:INVENTORY were analyzed to measure three aspects of reliability. First, internal consistency was examined with Cronbach's Alpha on the item scores within each domain (Bailey, 2004). Second, agreement between different domain scores of the ASQ:INVENTORY was measured using the Pearson's product-moment correlation coefficients by age groups. Scores of domains related in construct (e.g., Gross Motor and Fine Motor) were expected to have high correlations, while domains focusing on different aspects of child development (e.g., Communication and Fine Motor) were assumed to have lower correlations (Bailey, 2004). Third, test-retest reliability was examined using Pearson's product-moment correlation coefficient comparing the scores between Time 1 and Time 2 administration of the ASQ:INVENTORY within one-week interval.

Research Question 3, Validity

The examination of validity of the Chinese ASQ:INVENTORY focused on concurrent validity, construct validity, known groups validity, and classification validity (i.e., sensitivity, specificity, true positive value, and true negative value).

Concurrent validity. Using the Beijing GDS as the criterion measure with children aged from 11 to 12 months, the agreement between the developmental quotient scores on the Beijing GDS and the *z* scores on the ASQ:INVENTORY was examined using Pearson product-moment correlation coefficients (Bailey, 2004). Correlational analyses were conducted on corresponding domain scores.

Known-groups validity. Known-groups validity was examined with the sub-group of children aged from 17 to 20 months, using a one-way ANCOVA to examine the relationship between the ASQ:INVENTORY domain scores and a child's disability status (i.e., disability, typically developing) documented in their medical records. In the ANCOVA analysis, the child's disability status serveed as a two-level independent variable – yes (i.e., the child has been identified with a disability) and no (i.e., the child has been identified as typical). Each domain raw score on the ASQ:INVENTORY served as the dependent variable. Children's age served as the covariate factor.

Sensitivity and specificity. To investigate how the ASQ:INVENTORY functions as a screening instrument -- that is, how the ASQ-C items within the ASQ:INVENTORY indicate whether a child needs further assessment -- the agreement between the disability status of children and screening classifications using the existing ASQ-C cutoff scores was examined. The two sub-groups of children aged from 17 to 20 months with known disability status (i.e., typical, with special needs) were included in this study. In each domain, the six ASQ:INVENTORY items that also appear on the ASQ-C were extracted to calculate ASQ-C domain scores in order to derive a screening classification – whether the child needs further assessment or not.

The urban Chinese ASQ-C cut-off scores (Bian et al., 2013) were used to

determine the screening classification results. A contingency table was developed comparing disability status and classification on the ASQ:INVENTORY. Figure 5 provides a matrix and the formulas for examining the agreement of classifications. Sensitivity, the capacity of an instrument to identify children eligible for disability services, and specificity, the instrument's ability to recognize children who did not need services because their development is truly typical was calculated (McLean, 2004).

		Known Disability Status	
		Yes (eligible for services)	No (typically developing)
Screening Classifications from ASQ:INVENTORY	Below cutoff scores (refer for further assessment)	A	B
	Above cutoff scores (no need to refer)	C	D

Figure 5. Matrix for examining classification agreements. Agreements between classifications were calculated on sensitivity = A/(A+C), specificity = D/(B+D), true positive value = A/(A+B), and true negative value = D/(C+D).

Research Question 4, Cultural Differences

As in research question 1, cultural differences were addressed using both CTT and IRT models. First, an independent t-test procedure was used to identify significant differences in domain scores across two countries; descriptive statistics were computed for each country and age interval combination group. Second, a Rasch one-parameter partial credit model was conducted on both the Chinese and English ASQ:INVENTORY scores to estimate differential item functioning (DIF) in item responses between China and the U.S. The DIF model examined the possibility that test items functioned differently between the focal and the reference groups while controlling for participants'

ability (Zumbo, 2007). In this study, the Chinese child participants served in the focal group and the retrospective American child participants were assigned to the reference group. For example, when a 6-month-old child in China and a 6-month-old child in the U.S. demonstrated the same gross motor skills, how likely were they to receive similar scores, given some margin of standard error?

DIF results were interpreted using the Educational Testing Service (ETS) standards, which defined three levels of DIF: level C = moderate to large [|DIF| ≥ 0.64 logits, prob (|DIF|≤ 0.43 logits) ≤ .05], level B = slight to moderate [|DIF| ≥ 0.43 logits, prob (|DIF| = 0 logits) ≤ .05], and level A = negligible (e.g., other than level B and C) (Zwick, Thayer, & Lewis, 1999). In this study, level C was used as the criteria to identify items functioned differently across two country groups. The DIF analyses were conducted using ConQuest 4.4 (Adams, Wu, & Wilson, 2015).

Research Question 5, Utility Perceived by Pediatricians and Parents

To measure the utility of the Chinese ASQ:INVENTORY, feedback was collected from pediatricians and parents/caregivers who participated in the study. First, descriptive statistics were conducted to summarize parents' responses to the six quantitative questions in the parent utility survey. Second, pediatricians' comments on the ASQ:INVENTORY in the utility interview were transcribed, summarized and interpreted for major patterns, relevance, salience, threads, and emergent themes by the principal researcher (Creswell & Clark, 2011). Results from both parent survey and pediatrician interview were integrated to inform further interpretations.

Summary

In the next chapter, results for each research question will be discussed. Implications will be also provided for the future implementation of and research on the Chinese ASQ:INVENTORY. A regional normative sample in Kunshan, China has been established and preliminary evidence for the reliability and validity of the Chinese ASQ:INVENTORY was collected. Feedback from caregivers and pediatricians who had experiences with the ASQ:INVENTORY were summarized. Results will inform future directions for research to improve the quality of the tool and the implementation in the early detection system in China.

CHAPTER IV

RESULTS

Results from data analyses are described. The first section presents the demographic information pertaining to the study participants. The second section describes the variance between two methods of completion: paper-pencil and on-line. The following five sections address each research questions, focusing on the reliability, validity, utility and cultural equivalence of the Chinese ASQ:INVENTORY.

Participants

A total of 812 children ages from one to 25 months in Kunshan, China participated in this study, including a regional normative sample of 774 and a sub-sample of 38 children with disabilities. Out of total participants, 426 (53%) were male and 366 (47%) were female. Sixteen trained pediatricians administered the Chinese ASQ:INVENTORY with caregivers, as well as administered the Beijing GDS using standardized procedures.

For a cross-cultural comparison, a pre-existing sample of 1,749 children from previous studies of the ASQ:INVENTORY conducted between 2012 to 2015 in the U.S was used. Each child in this dataset was only tested in one of the five domains in the ASQ:INVENTORY. The sample size in each domain ranged from 248 to 479. The majority (1,031) of the English ASQ:INVENTORY data were collected by researchers using paper-pencil format, while others (718) were collected by caregivers using an online system. Table 7 summarizes the number of child participants in each domain by country.

Table 7. *Number of ASQ:INVENTORY Participants by Domain and Country*

	China (Simplified Chinese)		United States (English)	Total
	Normative sample	Sub-sample with identified disability		
Communication	774	38	425	1237
Gross motor	772	38	479	1289
Fine motor	774	38	261	1073
Problem solving	774	38	248	1060
Personal-social	771	38	336	1145

Age of Children

The number of Chinese children tested in each of the 12 ASQ-C intervals ranged from 38 to 107 by domain. For U.S. children, the number ranged from 5 to 111 by domain. Table 8 and 9 summarized the age distribution across two countries by domain.

Table 8. *Number of Participants by Domain (i.e., Communication, Gross Motor, Fine Motor) and Country*

ASQ-C Age Intervals	Communication		Gross Motor		Fine Motor	
	China	U.S.	China	U.S.	China	U.S.
2 month (1 - 2 months)	92	106	92	111	92	98
4 month (3 - 4 months)	107	40	107	48	107	26
6 month (5 - 6 months)	71	31	71	64	71	50
8 month (7 - 8 months)	59	36	59	36	59	10
10 month (9 - 10 months)	38	36	38	34	38	17
12 month (11 - 12 months)	101	55	101	38	101	15
14 month (13 - 14 months)	58	18	58	22	58	5
16 month (15 - 16 months)	38	25	38	26	38	16
18 month (17 - 18 months)	95	15	95	19	95	6
20 month (19 - 20 months)	45	30	45	34	45	7
22 month (21 - 22 months)	40	18	40	13	40	6
24 month (23 - 24 months)	68	15	66	34	68	5

ASQ-C: Ages & Stages Questionnaires, Third Edition, Chinese version.

Table 9. *Number of Participants by Domain (i.e., Problem Solving, and Personal-Social) and Country*

ASQ-C Age Intervals	Problem Solving		Personal-Social	
	China	U.S.	China	U.S.
2 month (1 - 2 months)	92	100	92	102
4 month (3 - 4 months)	107	27	107	38
6 month (5 - 6 months)	71	48	71	57
8 month (7 - 8 months)	59	10	59	15
10 month (9 - 10 months)	38	10	38	21
12 month (11 - 12 months)	101	9	101	24
14 month (13 - 14 months)	58	5	58	10
16 month (15 - 16 months)	38	10	38	16
18 month (17 - 18 months)	95	6	95	12
20 month (19 - 20 months)	45	6	45	19
22 month (21 - 22 months)	40	7	40	11
24 month (23 - 24 months)	68	10	66	11

Child and Family Characteristics

Chinese sample. Table 10 presents the overall demographic information pertaining to Chinese and U.S. child participants. In China, the ASQ:INVENTORY questionnaires were completed by pediatricians with the assistance from caregivers. A majority of caregivers were mothers (501, 62%), followed by grandparents (190, 24%) and fathers (75, 9%). In terms of mother's education level, more than half had a college degree (i.e., associate, undergraduate, or graduate). Forty percent (326) of families earned an annual income of more than 40,000 Chinese RMB. Most Chinese children (733, 90%) were reported as belonging to the Chinese Han ethnic group.

Twenty-five children (3%) were reported as having some kind of disability, while no information was provided about the disability status of the majority (749, 92%). In addition to the normative sample, data were collected from a sub-sample of 38 (5%)

children ages from 17 to 20 months, who were identified as having some disability according to their medical records. The Chinese regional sample of 774 children used in answering research questions 1, 2, 4 and 5 did not include the 38 children with identified special needs, in order to best represent the population. This sub-sample was only included in studies on known-groups validity and sensitivity/specificity of the ASQ:INVENTORY.

U.S. sample. Nine hundred forty-five boys (54%) and 798 girls (46%) were included in the U.S. sample. Parents (1,642, 94%) were the major respondents, followed by researchers. Among those that reported the mother's level of education (958, 55%), a majority (642, 67%) had a four-year college degree or above. However, 791 (45%) did not report mother's education level. Among those that reported family income (897, 51%), a majority (595, 66%) earned than 40,000 U.S. dollars a year. Related to geographical region, reported states of residence were categorized into four regions (e.g., Northeast, Midwest) defined by the U.S. Census Bureau (2015). The majority of participants resided in the West (1086, 62%), mainly from New Mexico and Oregon, with less from the Northeast, Midwest, and South. The majority of children, 1665 (95%) were reported as typically developing (367, 21%), or no information was provided about their disability status (1298, 74%).

Table 10. *Demographic Characteristics of Children and Families by Countries*

	China	United States
Total number of participants	812	1749
Gender		
Male	426 (52.5%)	945 (54.03%)
Female	386 (47.5%)	798 (45.63%)
Missing	0 (0%)	6 (0.34%)

Table 10. *(continued)*

	China	United States
Person Completed the ASQ:INVENTORY		
Pediatrician (collaborating with caregivers)	812 (100%)	0 (0%)
Parent	0 (0%)	1642 (93.88%)
Others	0 (0%)	97 (5.55%)
Missing	0 (0%)	10 (0.57%)
Mother's education		
Less than high school	205 (25.2%)	19 (1.09%)
High school	168 (20.7%)	182 (10.41%)
AA degree	266 (32.8%)	95 (5.43 %)
Four year college/above	161 (19.8%)	642 (36.71%)
Don't know	1 (0.1%)	20 (1.14%)
Missing	11 (1.4%)	791 (45.23%)
Income (Chinese RMB/US$)		
0-12,000	44 (5.4%)	97 (5.55%)
12,001-24,000	167 (20.6%)	83 (4.75%)
24,001-40,000	262 (32.3%)	122 (6.98%)
Over 40,000	326 (40.1%)	595 (34.02%)
Missing	13 (1.6%)	852 (48.71%)
Race/ethnicity (China/US)		
Chinese Han/White	733 (90.3%)	623 (35.62%)
Others	13 (1.6%)	1019 (58.26%)
Missing	66 (8.1%)	107 (6.12%)
Geographical region (China/US)		
Urban/Northeast	424 (52.2%)	102(5.8%)
Rural/Midwest	173 (21.3%)	132 (10.1%)
Not applicable/South	Not applicable	156 (8.9%)
Not applicable /West	Not applicable	1086 (62.1%)
Missing	215 (26.5%)	273 (15.6%)
Special needs		
No special needs reported	749 (92.2%)	1665 (95.2%)
Parent reported special needs	25 (3.1%)	84 (4.8%)
Medical record showed special needs	38 (4.7%)	0 (0%)

Completion Method

In order to identify any differences between completion method (i.e., conventional paper-pencil and on-line) in two countries, an ANCOVA analysis was conducted using children's age as the covariate. The independent variable was completion method by country, including three groups: Chinese paper-pencil, U.S. paper-pencil, and U.S. on-line. Table 11 shows the distribution of the two methods of administration across countries and domains.

Table 11. *Number of Participants by Country, Completion Method and Domains*

Domain	China (Simplified Chinese)	United States (English)	
	Paper-pencil	Paper-pencil	On-line
Communication	774	182	243
Gross Motor	772	214	265
Fine Motor	774	213	48
Problem Solving	774	213	35
Personal-Social	771	209	127

Results indicated that, when controlling for age, significant differences existed between the three groups in all five domains. Specifically, in Gross Motor, Fine Motor, Problem Solving and Personal-Social domains, ASQ:INVENTORY scores completed using an on-line method were consistently higher than using a paper-pencil method, regardless of country. However, Communication score completed on-line was lower than using a paper-pencil method in the U.S. sample, although still higher than using a paper-pencil method in the Chinese sample. Tables of the unadjusted and adjusted means and variability based on completion method and country, and full ANCOVA results are listed in Appendix B.

Child Development

Research Question 1. Do the Chinese ASQ:INVENTORY domain scores and the order of items reflect the hierarchy of child development in China?

Classical Test Theory

Using a quantile regression approach, the polynomial trend lines were estimated to display trends in percentile scores (i.e., 10th-, 25th-, 50th-, 75th-, and 90th-percentile) from five domains of the Chinese ASQ:INVENTORY, as shown in Figures 6-10. The polynomial trend lines were generated from the following regression equation:

$$y = b + c_1x + c_2x^2 + c_3x^3 + \cdots + c_\sigma x^\sigma$$

The five trend lines in each domain represented an increasing trend of the ASQ:INVENTORY score as age increased. The r^2 value of the trend lines ranged from .97 to .99, indicating good representation of the data.

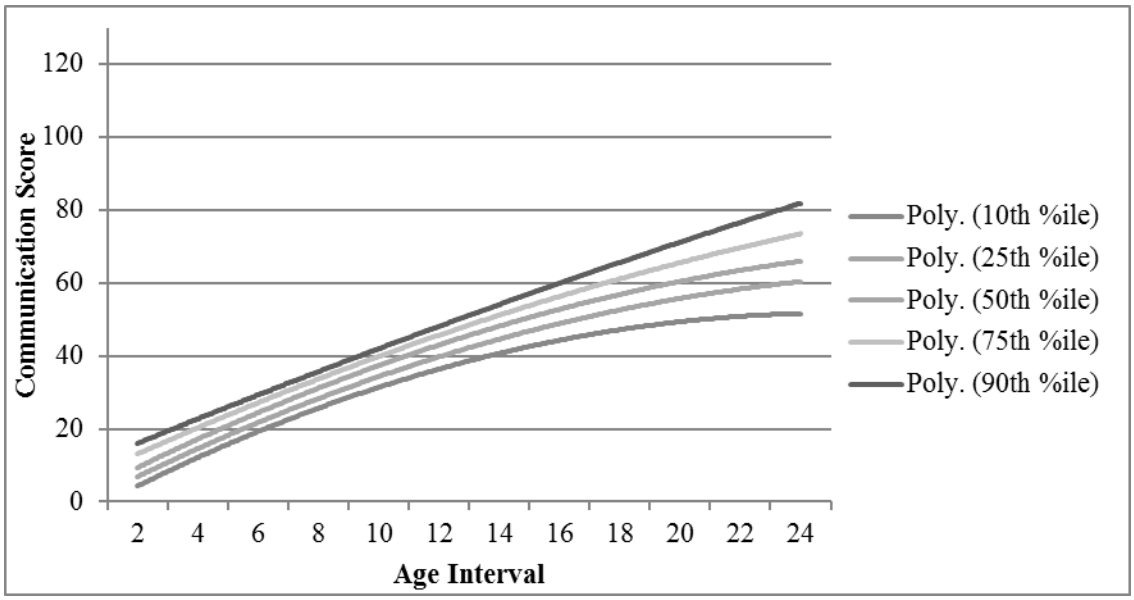


Figure 6. Polynomial Trend Lines of Percentile Scores on the Chinese ASQ:INVENTORY, Communication domain

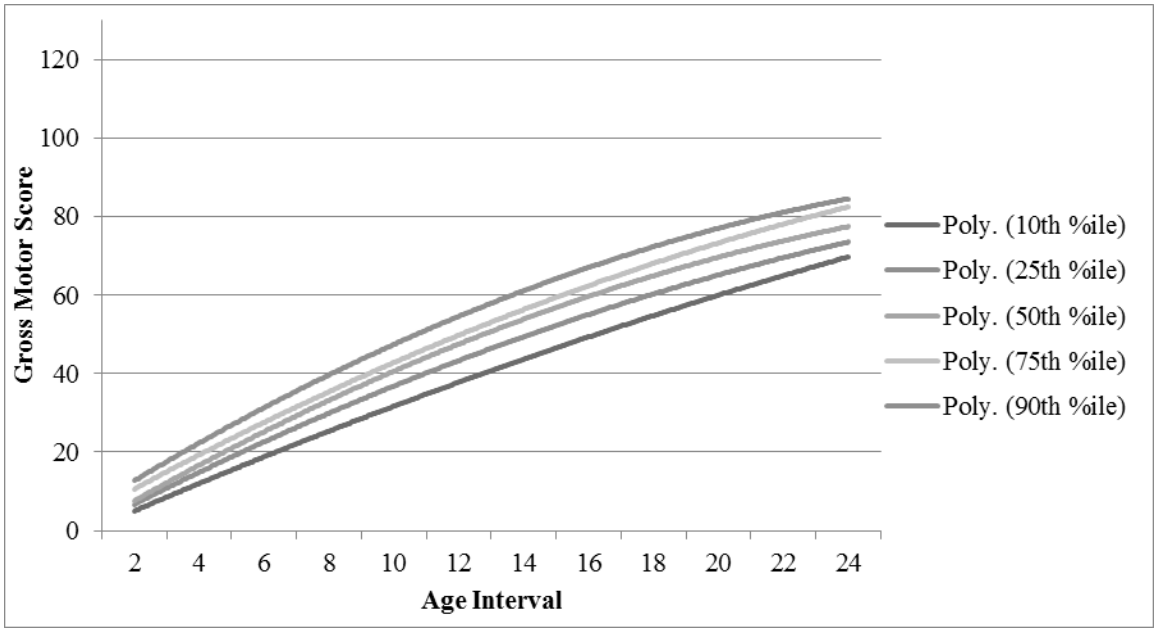


Figure 7. Polynomial trend lines of percentile scores on the Chinese ASQ:INVENTORY, Gross Motor domain

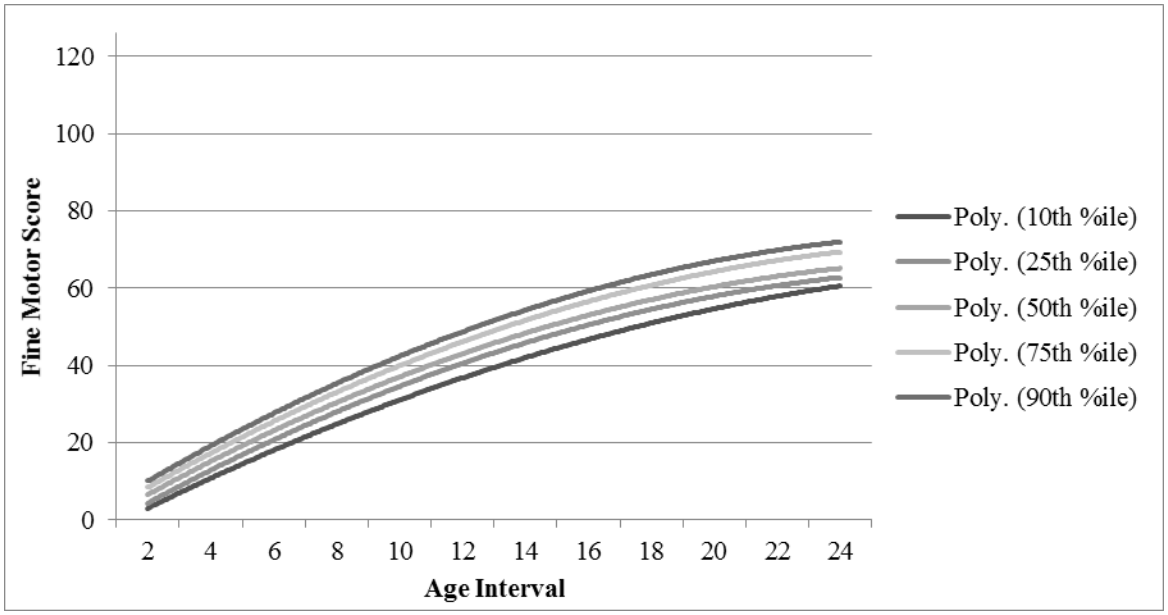


Figure 8. Polynomial trend lines of percentile scores on the Chinese ASQ:INVENTORY, Fine Motor domain

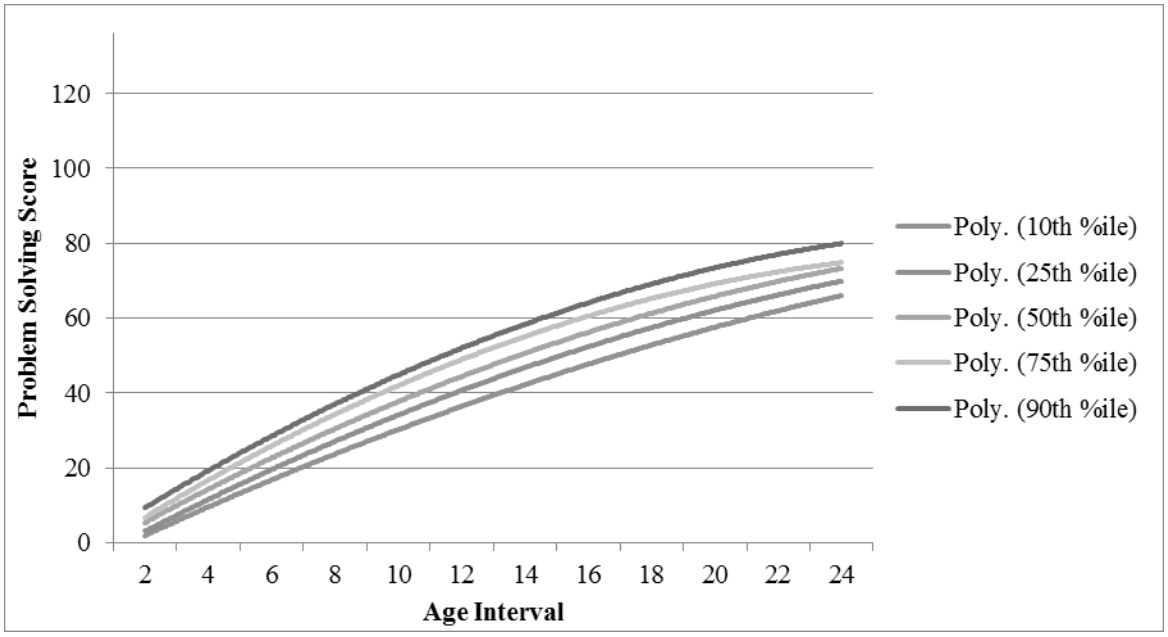


Figure 9. Polynomial trend lines of percentile scores on the Chinese ASQ:INVENTORY, Problem Solving domain

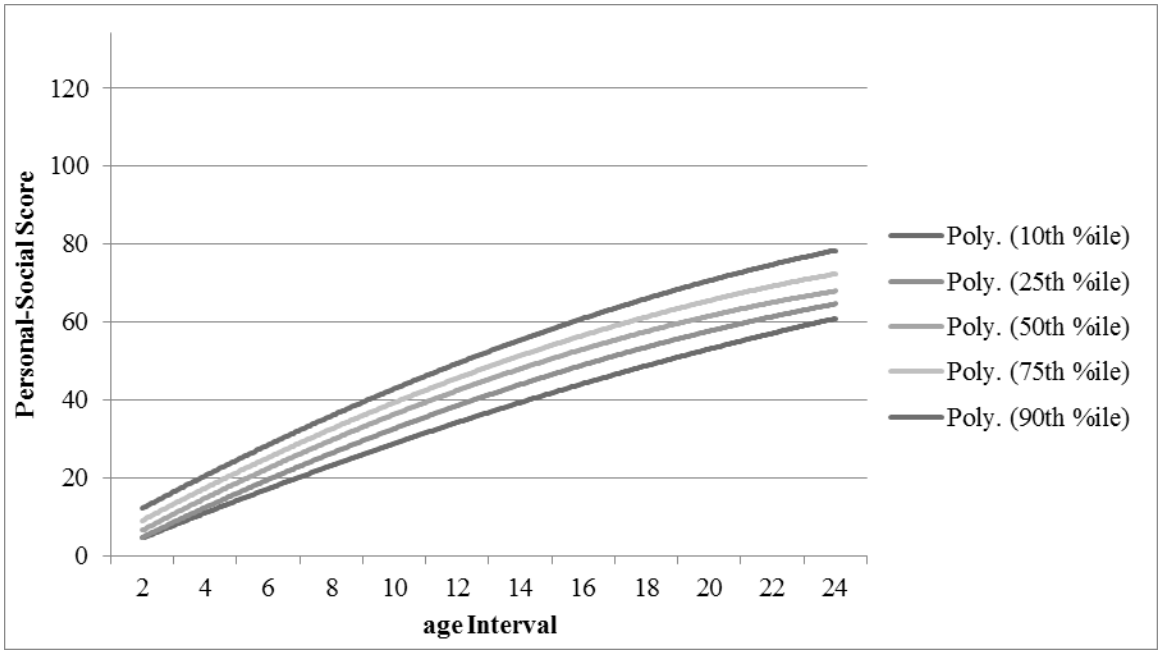


Figure 10. Polynomial trend lines of percentile scores on the Chinese ASQ:INVENTORY, Personal Social domain

Item Response Theory

Item difficulty. Using a Rasch one-parameter partial credit model, item difficulty statistical results show how likely an item is scored with consideration of a participant's ability level. When a participant has 50% chance of receiving a rating of "yes" on a specific item, the difficulty of this item is calibrated (Embretson & Reise, 2000). Aligning with the basal and ceiling rules in administering the Chinese ASQ:INVENTORY, all items before the basal point were assumed to have received a score of "2" and all items after the ceiling point were assumed to have scored "0". However, the original three levels of responses (i.e., 0, 1, 2) were collapsed to two levels (i.e., 0, 1) by recoding all "2" responses to "1" responses, since the original "1" response was rarely selected, which resulted in insufficient data for calibration. Similarly, some items were excluded from the IRT calibration due to lack of variability (e.g., all participants scored "0"). Tables in Appendix D summarize item difficulty results across the ASQ:INVENTORY five domains.

Item order by difficulty. The Chinese ASQ:INVENTORY retained the same item order as in English ASQ:INVENTORY, which was designed based on the results from previous IRT studies on the tool (e.g., Clifford, 2006; Chen, 2013). When calibrated on the Chinese sample, results indicated that overall, item difficulty matched their order in the questionnaire. The administration of the Chinese ASQ:INVENTORY required establishing a basal of four consecutive items scored "2", and a ceiling of four consecutive items scored "0". Therefore, a difference between the original order and the item difficulty of four positions or more was considered as a noteworthy change in item order. Using this criterion, a total of 15 items (6%), eight in Communication, three in

Problem Solving, and four in Personal-Social, indicated a noteworthy change in item order. No item was found with noteworthy change in item order in Gross Motor and Fine Motor domains.

Item fit. Item fit statistics describe how well the IRT model applied explains or matches the participants' responses to a specific item (Embretson & Reise, 2000). The statistical software, ConQuest 4.4 (Adams, Wu & Wilson, 2015), generates two types of item fit results: the unweighted fit mean-square (MNSQ) and the weighted fit MNSQ. Both unweighted and weighted fit MNSQ values indicate unexpected responses to an item. However, weighted fit is usually considered as a more important indicator of item fit since it is sensitive when the item difficulty is considered matching a participant's skill level, while unweighted fit is more sensitive when an item is considered too easy or too difficult for a participant. The best fit value of MNSQ for the Rasch model is 1.00, with an acceptable range from ¾ to 4/3 (Wu, Adams & Wilson, 1998). A MNSQ value below ¾ is considered to be "*overfit*", which indicates the item is overly predictable (e.g., too few unexpected responses). A MNSQ value above 4/3 is considered to be "*underfit*", which indicates the responses to this item were less predictable using the selected IRT model. Therefore, an *underfit* value usually raises more concerns to test developers.

Weighted fit MNSQ. Results identified a total of 213 (84.2%) items in five domains with a MNSQ value below ¾, which indicated a participant's response to these items was highly predictable, when the item difficulty matched the participant's skill level. No item was found to be "*underfit*".

Unweighted fit MNSQ. All calibrated items were found "*overfit*" based on the unweighted fit MNSQ, except for two "*underfit*" items – item #17 in Communication and

item #9 in Problem Solving. Results showed that when a participant's skill level was above or below the item difficulty, most items were overly predictable with only two items unpredictable.

Reliability

Research Question 2: Does the Chinese ASQ:INVENTORY yield consistent results?

Reliability is a critical psychometric characteristic that focuses on the consistency of assessment results (Salvia, Ysseldyke & Bolt, 2013). A reliable instrument should consistently generate similar results when administered to the same child. This study examined the internal consistency and test-retest reliability of the Chinese ASQ:INVENTORY.

Internal Consistency.

Correlations at the item level. Item level data from the Chinese normative sample (n = 774) were examined using Cronbach's Alpha. Some items were excluded from the analysis because no children obtained a score on it. Strong correlations were found in all five domains, ranging from .96 to .97, as presented in Table 12.

Table 12. *Cronbach's Alpha in the ASQ:INVENTORY Five Domains*

Domain	Cronbach's Alpha	*N* of Included Items	% of Included Items
Communication	.96	58	89.23%
Gross Motor	.97	48	73.85%
Fine Motor	.96	46	73.02%
Problem Solve	.97	54	79.41%
Person-Social	.96	63	94.03%

Correlations between domains and with total score. In addition, for children ages 1-12 months old, Pearson's product-moment correlation coefficients ranged from .92 to .96 between domains, and .97 to .98 with total score. For children ages 13-25

months old, correlation coefficients between domains ranged from .80 to .91 between domains, and .93 to .97 with total score. All correlations were statistically significant at $p < .01$ level, as shown in Table 13.

Table 13. *Correlation Coefficients (Pearson's Product-moment) Between Domains and with Total ASQ:INVENTORY Score by Two Age Intervals*

	CM	GM	FM	CG	PS	Total
1 to 12 months						
Communication		.92**	.93**	93**	.93**	.97**
Gross motor			.93**	.93**	.93**	.97**
Fine motor				.96**	.94**	.98**
Problem solving					.95**	.98**
Personal-social						.98**
13 to 25 months						
Communication		.80**	.84**	.87**	.89**	.93**
Gross motor			.87**	.89**	.87**	.94**
Fine motor				.91**	.89**	.95**
Problem solving					.91**	.97**
Personal-social						.96**

** $p < .01$

Test-Retest Reliability

Chinese ASQ:INVENTORY domain scores from repeated administrations at 1-3 week intervals on the same child were compared to determine whether the Chinese ASQ:INVENTORY generated consistent results on the same child over a short period of time. Table 14 describes Pearson's product-moment correlation coefficient, as well as the means and standard deviations. Significantly high correlations were found across two times of administration in all five domains, ranging from .91 to .99.

Table 14. *Test-Retest Reliability; Correlations of Domain Scores on ASQ:INVENTORY between Two Times of Administration (n = 23)*

Domain	Time 1		Time 2		*r*
	M	*SD*	*M*	*SD*	
Communication	42.13	23.32	44.00	22.80	0.99**
Gross Motor	41.43	21.72	42.61	21.46	0.91**
Fine Motor	39.09	18.47	41.78	18.94	0.98**
Problem Solving	40.04	23.55	42.48	22.92	0.98**
Personal-Social	40.09	24.75	42.48	24.66	0.99**

** $p < .01$

Validity

Research Question 3: How accurate is the Chinese ASQ:INVENTORY in measuring child development?

Validity, which refers to whether a tool is measuring what it supposed to measure, is the most fundamental consideration in developing an assessment tool (Salvia et al., 2013). Evidence for the validity of the Chinese ASQ:INVENTORY was examined in three aspects: concurrent validity, known-groups validity, and the agreement between the classification results from the ASQ:INVENTORY and children's known disability status.

Concurrent Validity

Concurrent validity was evaluated by examining the agreement between children's scores on the Chinese ASQ:INVENTORY and the Beijing GDS. In order to compare to the developmental quotient (DQ) scores from the Beijing GDS, calculated by dividing the developmental age of a child by their chronological age, a *z*-score for each domain of the Chinese ASQ:INVENTORY was computed based on the normative sample ($n = 774$). Pearson correlation coefficients indicated that four comparison pairs were highly correlated at the .01 level, while the Communication domain in the Chinese

ASQ:INVENTORY and the Language domain in the Beijing GDS showed a relatively low correlation of .29, yet still significant at the .05 level. Table 15 presents the correlation coefficients between the two measures.

Table 15. *Correlation Coefficients (Pearson Product Moment) between the ASQ:INVENTORY Domain z Scores and the Beijing GDS Developmental Quotient Scores (n = 53)*

ASQ:INVENTORY (*z*-score)	Beijing GDS (DQ)				
	Language	Gross Motor	Fine Motor	Adaptive	Personal-Social
Communication	.29*				
Gross motor		.89**			
Fine motor			.74**		
Problem solving				.81**	
Personal-social					.89**

DQ: Developmental quotient. * $p < .05$, ** $p < .01$

Known-Groups Validity

Assumptions. Prior to examination of the ANCOVA analysis, several assumptions were tested. The dependent variable (i.e., ASQ:INVENTORY domain score) was approximating normal distribution with negative skewness in all five domains. Equal variance of the dependent variable at both levels of the independent variable (i.e., typically developing, has special needs) was supported. The dependent variable value on each child was obtained independently from other children. The equal slopes of the linear relationship between the covariate (children's age) and the dependent variable at both levels of the independent variable were supported.

Results. Significant differences at the .01 level were found between the two groups by disability status across all five domains, when controlling for age. Specifically, children with identified special needs scored significantly lower in all domains of the

Chinese ASQ:INVENTORY. Table 16 summarized the adjusted means and standard deviations for both groups across five domains, as well as the between-group *F* ratio from the ANCOVO results. Table 16 summarizes the adjusted means and standard deviations of the domain scores across two groups and five domains, as well as the F ratio and significance from ANCOVA. All tables of the unadjusted and adjusted means and variability based on disability status and domains, and full ANCOVA results are listed in Appendix E.

Table 16. *Summary of ANCOVA Results Comparing the ASQ:INVENTORY Domain Scores Between Disability Group and Typical Group (n = 44), Using Age as a Covariate*

Domain	Disability Group Adjusted *M (SD)* (*n* = 38)	Typical Group Adjusted *M (SD)* (*n* = 44)	*F* (1, 79)
Communication	34.53 (1.79)	59.06 (1.66)	100.71***
Gross motor	36.71 (1.76)	69.16 (1.64)	181.93***
Fine motor	33.86 (1.82)	59.58 (1.69)	106.75**
Problem solving	33.23 (1.95)	66.08 (1.81)	152.52***
Personal-social	29.84 (1.91)	60.91 (1.77)	142.38***

** $p < .01$, *** $p < .001$

Classification Agreement

Classification results (i.e., needs for referral to further assessment, no need to refer) of the Chinese ASQ:INVENTORY were determined by calculating the ASQ-C domain scores by extracting screening items from the larger pool of ASQ:INVENTORY items, based on a child's age interval. The total score of the extracted ASQ-C items were then compared by domain with the Chinese cut-off scores. Children who scored above the cut-off point were considered not in need of referral, while children who scored below the cut-off point were considered in need of referral. A 2 x 2 contingency table was used to compare the categorization results from the Chinese ASQ:INVENTORY

with the known disability status (i.e., typically developing or identified with some disabilities) of children. Table 17 presents the results of classification agreement in terms of sensitivity, specificity, true positive value, and true negative value.

Table 17. *Specificity and Sensitivity of the ASQ:INVENTORY by Domain (n = 53)*

Domain	Sensitivity	Specificity	True positive value	True negative value
Communication	0.92	0.91	0.90	0.93
Gross motor	0.74	0.80	0.76	0.78
Fine motor	0.82	1	1	0.86
Problem solving	0.89	0.98	0.97	0.91
Personal-social	0.92	0.93	0.92	0.93

Cross-Cultural Comparison

Research Question 4. Are there differences in the responses across China and the U.S.? On which items do differences occur?

Classical Test Theory (CTT)

Comparing the Chinese normative sample (n = 774) to the U.S. pre-existing sample (1,749), significant differences were found in 29 (48%) of all 60 country and age combination groups (see Table 18). Children from the U.S. were rated significantly higher than their peers in China in all 29 groups. Specifically, in each domain, the percentage of age intervals where significant differences were found ranged from 33% to 67%. When looking across domains, significant differences were found in 11 out of 12 age intervals, with no significant difference found in the 10-month interval. Table 18 lists the mean and standard deviation for each country and age combination group.

Table 18. *Means and Standard Deviations of ASQ:INVENTORY Domain Scores by Domains, Age Intervals and Countries.*

Age (mo)	Sample	Communication		Gross Motor		Fine Motor		Problem Solving		Personal-Social	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
2	China	8.92	5	10.84	4	9.95	3	7.26	3	8.72	4
	US	21.40***	7	17.65	7	12.29***	4	11.36***	4	18.59***	8
4	China	17.56	4	16.89	3	13.96	3	10.73	3	14.44	3
	US	29.38	8	23.4**	7	21.27***	6	18.60***	7	21.68***	15
6	China	26.64	4	24.41	4	25.46	5	22.67	6	21.78	5
	US	29.68*	6	30.02*	8	30.46	6	29.15	6	21.95***	8
8	China	31.77	5	30.92	4	34.39	5	33.18	5	31.02	4
	US	34.78	11	35.39**	7	39.60	7	35.90	7	32.07*	11
10	China	36.73	6	36.68	6	39.2	5	36.27	5	34.89	6
	US	38.81	16	37.65	7	45.88	6	40.20	7	40.62	5
12	China	42.89	6	45.34	6	44.26	5	43.00	5	40.08	6
	US	50.24	8	49.13***	11	49.87	6	44.89	3	47.83***	19
14	China	48.12	5	53.05	8	48.53	4	48.46	7	46.60	7
	US	46.33	7	54.68*	12	51.80	5	53.00	10	60.3**	16
16	China	51.58	5	64.22	6	52.92	8	58.83	6	55.47	7
	US	52.00*	11	65.15	9	59.44*	8	60.60	8	59.00	11
18	China	54.86	5	66.46	6	57.20	4	62.96	5	58.10	5
	US	64.47***	22	74.68*	11	57.33	6	60.67	6	66.00	10
20	China	63.08	6	70.03	5	60.49	4	67.78	4	62.57	5
	US	64.30***	19	73.03***	11	61.71	8	70.5*	8	74.84***	21
22	China	65.76	11	72.11	7	63.50	5	67.79	7	64.90	11
	US	74.22	16	75.85	8	69.83*	9	81.71**	20	77.64	15
24	China	68.13	10	75.80	6	66.49	6	72.27	6	68.56	8
	US	83.07**	17	83.91***	13	71.00	5	77.40	10	78.82	11

* $p < .05$; ** $p < .01$; *** $p < .001$

Item Response Theory (IRT)

DIF analysis. DIF analysis identifies any test items that function differently across groups. In this study, DIF analysis was conducted to identify possible differences in item functioning between the two samples collected in China and the U.S. While CTT

analysis described the significant differences in the means of domain scores, DIF analysis detects differences in the response patterns of each item across the two groups, with consideration of participants' skill levels (Embertson & Reise, 2000).

Results indicated 203 out of 245 items (82.9%) functioned differently between the two countries. Of the 203 items, 170 items appeared to be more likely to score for the U.S. sample and 33 for Chinese sample. Table 19 presents the items on which moderate to large level of DIF was detected, as well as which country group was more likely to score.

Table 19. *Items Presented with Large Level of DIF across Chinese and English Versions by Domain.*

Domain	*n*	# of DIF items	DIF items
Communication	1199	49	#2(C), #3(E), #4(E), #5(E), #6(E), #7(E), #8(E), #9(E), #10(E), #11(E), #12(E), #13(E), #14(E), #15(E), #16(E), #17(E), #18(E), #19(E), #20(E), #21(E), #22(E), #23(E), #24(E), #25(E), #26(E), #27(E), #28(E), #29(E), #30(E), #31(E), #32(E), #33(E), #34(E), #35(E), #36(E), #37(E), #38(E), #39(E), #40(E), #42(E), #43(E), #48(E), #49(E), #51(E), #54(E), #55(E), #56(E), #57(E)
Gross motor	1251	23	#1(E), #2(E), #4(C), #5(E), #8(C), #10(C), #16(E), #19(E), #22(E), #23(E), #24(C), #35(E), #36(C), #38(E), #39(C), #40(C), #41(C), #42(C), #43(C), #44(C), #45(C), #46(C), #47(C)
Fine motor	1035	42	#2(E), #3(E), #4(E), #5(E), #6(E), #7(E), #8(E), #9(E), #10(E), #11(E), #12(E), #13(E), #14(E), #15(E), #16(E), #17(E), #18(E), #19(E), #20(E), #21(E), #22(E), #23(E), #24(E), #25(E), #26(E), #27(E), #28(E), #29(E), #30(E), #31 (E), #32(E), #33(E), #34(E), #35(E), #36(E), #37(E), #38(E), #40(E), #41(E), #42(C), #43(E), #45(E)

Table 19. *(continued)*

Domain	*n*	# of DIF items	DIF items
Problem solving	1022	51	#2(E), #3(E), #5(E), #6(E), #7(E), #8(E), #9(E), #10(E), #11(E), #12(E), #13(E), #14(E), #15(E), #16(E), #17(E), #18(E), #19(E), #20(E), #21(E), #22(E), #23(E), #24(E), #25(E), #26(E), #27(E), #28(E), #29(E), #30(E), #31(E), #32(E), #33(E), #34(E), #35(E), #36(E), #37(E), #38(E), #39(E), #40(E), #41(E), #42(E), #43(E), #44(E), #45(E), #46(E), #47(E), #48(E), #50(E), #51(E), #52(E), #53(E), #54(E)
Personal-social	1107	38	#1(E), #2(E), #5(E), #7(E), #8(E), #9(E), #10(E), #11(E), #12(E), #13(E), #14(E), #15(E), #16(E), #18(E), #19(E), #20(E), #21(E), #23(E), #24(E), #27(E), #28(E), #29(C), #33(C), #34(C), #35(C), #37(C), #38(C), #39(C), #41(C), #43(C), #44(C), #45(C), #46(C), #47(C), #48(C), #53(C), #57(C), #62(C)

Note. The letter in the parentheses indicates which language sample the item was shown more likely to score. E = English ASQ:INVENTORY; C = Chinese ASQ:INVENTORY.

Utility

Research Question 5. How do pediatricians and caregivers/parents in China perceive the usefulness of the Chinese ASQ:INVENTORY?

Utility Parent Survey

One hundred and sixty-nine out of 774 caregiver participants completed the six-question utility survey. The survey asked parents how long it took to complete the Chinese ASQ:INVENTORY assessment for their child, to compare the Chinese ASQ:INVENTORY with other child developmental assessment tools they had experience with, and to rate their experiences with the Chinese ASQ:INVENTORY (e.g., how much they learned more about their child's development, how important the targeted skills

were to their child, how they felt involved and respected in the assessment process, and how likely they would recommend the Chinese ASQ:INVENTORY to other people).

Background information. Caregivers of children from across 12 age intervals participated in the survey, with similar demographic characteristics as the normative sample in percent of children with disabilities, ethnicity, gender, urban/rural location, and family income. Again, the majority respondents were mothers (59%); More fathers participated in the survey sample (23%) than in the normative sample (9%); grandparents made up a smaller percentage in the survey sample (6%) than in the normative sample (24%). A larger percentage of children whose mother had a bachelor's degree or higher education attainment participated in the survey (26%) than in the normative sample (20%).

Time for administration. Caregivers reported spending 10 to 70 minutes to complete all five domains of the Chinese ASQ:INVENTORY on their child, with a mean of 33 minutes and a standard deviation of 13. As children's age increased, caregivers' reported time needed for administration increased ($r = .91$, $p < .01$)

Comparison with other child development assessments. A majority of caregivers (157, 93%) reported that the Chinese ASQ:INVENTORY was the only child developmental assessment they had experiences with, while four (2%) reported using the ASQ-C; one (0.6%) reported using the Beijing GDS, and one (0.6%) reported using other tools but did not provide specific information about which tool. No qualitative information was reported on follow-up question about the advantages and disadvantages of the Chinese ASQ:INVENTORY when compared to other assessment tools.

Better understanding of child development. A majority of caregivers (164, 97%) rated either a "4" (i.e., agree) or a "5" (i.e., strongly agree) on the statement, "I feel understanding my child's development better after participating in the ASQ:INVENTORY assessment". Only four (3%) responded with disagree or strongly disagree.

Critical skills. A majority of caregivers (161, 96%) reported agree or strongly agree to the statement, "I think the skills described in the ASQ:INVENTORY items are critical and representative to my child's age". Seven caregivers (4%) reported disagree or strongly disagree.

Involvement and respect. Most caregivers (165, 98%) reported feeling that their opinions about their child's development were given serious considerations during the assessment. Three (2%) caregivers disagreed or strongly disagreed with this statement.

Recommendation. Most caregivers (162, 96%) indicated that they would recommend the Chinese ASQ:INVENTORY to someone who has concerns about their child's development. Six caregivers (4%) reported disagreement on this item.

Pediatrician Interview

Fifteen out of 16 pediatricians who used the Chinese ASQ:INVENTORY to collect child developmental data participated in one-on-one interviews. During the interview, pediatricians were first asked about their professional background and experiences in early childhood developmental assessment, then asked to reflect on their experiences using the Chinese ASQ:INVENTORY.

Background information. The participants' age ranged from 27 to 42 years (M = 34, SD = 5.4). There were 14 females and one male who participated. Fourteen

pediatricians possessed a bachelor's degree, one with an associate degree in medical science. On average, they had 8 years of practices in well-child health care, ranging from two to 24 years. They generally had fewer years of experiences in providing child developmental assessment services, ranging from six months to 10 years, with a mean of 4.5 years.

Time for administration. All 15 pediatricians reported that the older or the higher developmental level the child was, the longer it took to complete the Chinese ASQ:INVENTORY. On average, it took about 16 to 28 minutes to assess babies 12 months old, and 33 to 63 minutes for children in the second year of their lives.

Advantages and disadvantages. Six (40%) participants reported no experience with other developmental assessment tools. Among the other nine participants, five (31%) mentioned using the DDST, four (25%) mentioned using the ASQ-C, three (19%) mentioned the Beijing GDS, and one (6%) mentioned the BSID. When asked to reflect on the advantages and disadvantages of the Chinese ASQ:INVENTORY, the six participants who had no experience with other tools reported no comparisons, while the other nine participants compared the Chinese ASQ:INVENTORY with other familiar tools. Qualitative responses from all 15 participants were summarized and grouped into four themes for advantages and four for disadvantages, as summarized in Table 20.

Table 20. *Summarized Themes from the Pediatricians' Qualitative Responses Regarding the Advantages and Disadvantages of the Chinese ASQ:INVENTORY*

	# of comments	Summarized description	Example comments
Advantages			
1. Comprehensive	11	Collects comprehensive information about a child's development, which is helpful for identifying children at risk in clinical services.	*"Assesses a more complete span of child development. A child can keep scoring above their age range."*
2. Parent friendly	8	Test items are easy for parents to understand, reflect parents' concerns, inviting parent involvement and educative. The lower starting points helped parents relax.	*"Many parents gained a better understanding of what children at this age are doing and learning to do from participating in the assessment. "*
3. Convenient	4	Acceptable amount of test items on one child, easy to administer, takes shorter time to complete (than does the BSID), especially for young babies.	*"The administration time is relatively shorter."* *"Easy to use."*
4. Child friendly	3	Items provide interesting activities for a child to interact with adults.	*"Children were encouraged to interact with adults. They enjoyed this tool because they could play."*
Disadvantages			
1. Cost	6	Requires trained professionals to administer and takes longer time to complete than the ASQ-C, especially for older children.	*"It took much more time to complete with older children who were typically developing."*
2. Difficulties in working with parents	3	Can be challenging when working with parents with low education level, or who over- or under-estimated their child, or who were not motivated to participate.	*" Some parents just say 'yes' to every question, but their child did not demonstrate even any emerging behaviors of the targeted skill during the interactions."*

Table 20. *(Continued.)*

	# of comments	Summarized description	Example comments
2. Difficulties in working with parents	3	Can be challenging when working with parents with low education level, or who over- or under-estimated their child, or who were not motivated to participate.	*" Some parents just say 'yes' to every question, but their child did not demonstrate even any emerging behaviors of the targeted skill during the interactions."*
3. Quality	2	The DDST requires more direct testing, the BSID has a longer list of items,when comparing to the ASQ:INVENTORY.	*"There are more items in each domains of the BSID, which collects more information."*
4. Editing	2	The wording and order of items can be improved.	*"I found a few items worded differently from the ASQ-C."*

Critical skills. Fourteen of the 15 participants responded positively (e.g., "definitely", "I think so", "overall, yes") to the question, "How do the ASQ:INVENTORY items represent the critical skills in each stage of development?" Some comments included, *"Very good. Parents were sometimes surprised and happy to find that their child was able to do so many things." "They are all very important skills. For example, these items about whether little babies can hold his head up when lying on his tummy, hold his head up when resting on her arms, and straighten both arms to push her chest off the floor. Even when I am not doing the ASQ:INVENTORY assessment, I still use some of its items in my daily clinical practice."* One of the participants did not respond to this question because she felt she did not have sufficient experience with developmental assessment to tell what skills are critical.

Utility. All fifteen participants reported that the Chinese ASQ:INVENTORY could be helpful in their well-child health care practice. Seven of them further commented on the need for innovations in the current infrastructure of the child health care system in order to provide the resources (e.g. time, personnel) for administering the tool. For example, a participant commented, *"It is definitely helpful to use the information collected on the ASQ:INVENTORY to facilitate our clinical decisions, especially about which child should be referred for diagnostic assessments. However, there are only two child health care doctors in our clinic to serve dozens of visits everyday. It takes extra pair of hands and longer visits to do the ASQ:INVENTORY, maybe on those children who showed concerns in a quick, 5-minute visit."*

Other suggestions. Nine participants responded to question, "Do you have other comments or suggestions that were not mentioned?" Six of them expressed expectations to implement the ASQ:INVENTORY in their daily clinical services. Two described their appreciation for the parent-friendly feature, which was documented in the "advantages" section. One participant suggested providing the Chinese ASQ:INVENTORY in a digital application format to enhance the efficiency of administration.

CHAPTER V

DISCUSSION

Increasing evidence supports the effectiveness of early intervention in improving developmental outcomes, reducing secondary disabilities or problems, supporting families, and saving societal resources (Johnson, Rahn & Bricker, 2015). Early identification of children who have or are at risk for developmental delays, as the first step to timely delivery of effective intervention services, has significant impacts on the well-being of young children and their families (Bricker et al., 2013).

In China, a low identification rate of children with disabilities is a serious barrier for children to access the services they need (Hu & Yang, 2013). According to the most recent official estimates, there are 1.68 million children from 0-6 with disabilities (CDPF, 2006). However, in the whole nation, only 48,000 children within this age range were diagnosed with disabilities in 2015. In order to develop a national system for early detection, the Chinese government announced the 2013 Guidelines (CCDCP, 2013a) to inform developmental screening and diagnosis of disabilities at the community/village level, the district/county level, and the municipal/prefectural level (see Figure 2).

Using culturally appropriate instruments with solid psychometric qualities to collect accurate information about a child's development is recommended by the American Academy of Pediatrics (2006) and the American Psychological Association (2016). In Chapter II, a review of recommended developmental assessment measures in the 2013 Guidelines identified major limitations, including outdated test items, questionable translation quality and psychometric properties, lack of parent involvement, and high cost.

Based on a review of the literature, the current research proposed and examined a newly translated and adapted developmental assessment, the Chinese ASQ:INVENTORY, to address the urgent needs for high quality and cost-effective measures in China. A discussion of results from the preliminary study on the psychometric properties, cultural relevance and perceived utility of the Chinese ASQ:INVENTORY is presented next. Limitations, and implications for future research and practice are also discussed.

Interpretation of Results

Participants

Small sample size. Data were collected from 812 Chinese children and a pre-existing sample of 1,749 children from the U.S. For each domain by age combination group, the Chinese sample size ranged from 38 to 107, whereas the U.S. sample size ranged from 5 to 111 (see across the 12 intervals in Table 8 and 9). In order to have a representative sample including minority groups, it is considered ideal to have sample sizes larger than 100 (Salvia et al., 2013). The relatively small sample size for some age and domain combinations might have caused larger random errors than expected in the analytic results.

Most caregivers were mothers. In both Chinese and U.S. samples, it was usually the mother who either assisted in (i.e., with paper-pencil data) or completed (i.e., on-line data) the ASQ:INVENTORY assessment. This finding is consistent with previous studies on the ASQ:INVENTORY (e.g., Chen, 2013; Clifford, 2006). A major difference is that pediatricians were responsible for completing all questionnaires for the Chinese sample with the assistance of caregivers, whereas in the U.S. sample, 41.1% were completed by

caregivers. Variations in respondents might have contributed to differences across countries.

Gender ratio. Children's gender ratio in the Chinese sample was similar to that in the overall population (i.e., 51% male and 49% female), based on the most recent Kunshan census data (City Bureau of Statistics of Kunshan, 2014). However, there were 8.4% more boys than girls in the U.S. sample. According to the U.S. 2012 Census, under age 5, 51% of the population was male and 49% was female. Boys were over represented in the U.S. sample.

Highly educated mothers. Children of mothers with low education attainment were under represented in the Chinese sample. According to data from 2014 Kunshan Census, only 15% of adults (i.e., 16 years and older) had an AA degree or above, while 69% completed less than high school. In this study, 53% of participating children's mothers had an AA degree or above, while 25% had less than high school education attainment. Similarly, in the U.S. sample, mothers who completed four years of college or above (28% in 2012 U.S. census) were over represented (37%), while those with less than high school education attainment (13% in 2012 U.S. Census) were under represented (1%). This is consistent with previous studies (e.g., Chen, 2013; Clifford, 2006). One possible explanation was that mothers with higher education attainment might be more likely to take their children to well-child check-ups at the community child health clinics, and were therefore were more likely to be recruited. The format of recruitment, by distributing a one-page recruitment flyer to caregivers, might also be a barrier to some mothers with lower education attainment. Finally, it was possible that once they received the recruitment flyer, well-educated mothers were more likely to sign up to participate

because they were more aware of the importance of developmental assessment.

Questionable family income information. The Chinese respondents reported lower family income than those reported in 2014 Census. Specifically, only 40% of respondents reported an annual family income of more than ¥40,000 (in Chinese RMB), which was only 85% of the average annual income per capita (City Bureau of Statistics of Kunshan, 2014). One possibility is in most participating families, only one member was employed, especially given the young age of their child. However, no data were found about the percentage of employment among parents of infants and toddlers in China. Another explanation was respondents misunderstood the question of "annual family income" as "annual personal income", which is a more commonly asked question in China.

The U.S. sample, on the other hand, reported family income information more representative of the general population. Based on data from 2012 census, 50% of U.S. families earned a household income of $51, 371. In this study, 66% (595) of respondents reported an income over $40,000. However, almost half (852, 49%) did not report their income level, which may bring questions to the representativeness of the data.

Completion Method

As summarized in Appendix B, results from the ANOCOVA showed significant differences in ASQ:INVENTORY domain scores in three groups (i.e., Chinese paper-pencil, U.S. paper-pencil and U.S. on-line). On-line data consisted of ratings by parents, while paper-pencil data were completed by researchers (i.e., trained pediatricians in China, researchers in New Mexico, and doctoral students at University of Oregon), with caregivers' assistance. When comparing the scores completed by the same method (i.e.,

paper-pencil), significant differences with a consistent pattern still existed between the two countries: Chinese scores were lower than U.S. scores in all domains. Since all data were collected from China using a paper-pencil method, it is unknown at this point whether completion method would have caused differences on the Chinese scores, as it did to the U.S. scores.

Research Question 1. Do the Chinese ASQ:INVENTORY domain scores and the order of items reflect the hierarchy of child development in China?

CTT. Results from CTT analyses supported that the Chinese ASQ:INVENTORY scores reflected the hierarchy seen in developmental scores for children in China. The percentile score trend lines from quantile regression analysis showed that the Chinese ASQ:INVENTORY domain scores increased as children's age increased (see Figure 6-10). In addition, none of the 90^{th} percentile trend lines reached the maximum possible scores in each domain, indicating that the Chinese ASQ:INVENTORY items covered a wide range of developmental levels that includes advanced development. Most children scored at least 1 point in each domain, indicating that the Chinese ASQ:INVENTORY also provided developmental data for children with delayed development. However, in one of the five domains, Problem Solving, two children with identified disability status did not score on any item. This finding leads to suggestions for adding new items to the Problem Solving domain to improve the representation of lower developmental skills.

Item difficulty. Results from IRT analyses (see Appendix D) indicated a wide range of difficulty in the Chinese ASQ:INVENTORY items, with some items estimated at the same level of difficulty, as summarized in Table 21. No items with the same difficulty estimate were found in the Fine Motor domain. In Communication, Problem

Solving and Personal-Social domains, items that shared identical difficulty estimates were generally later items on the scale that measured a more advanced level of development. For example, only 83 (12%) children scored a "2" (yes) or "1" (sometimes) on item #32 in Communication, "*Without giving your child help by pointing or using gestures, ask him to 'put the book on the table' and 'put the shoe under the chair.' Does your child carry out both of these directions correctly?*" The median age of children scored on this item was 22 months. Therefore, identical estimates of item difficulty might be due to the young age range of the sample that resulted in a small number of respondents for difficult items. For future studies, it would be helpful to collect data on older children to increase the variance in responses to difficult items.

Table 21. *Items Estimated with Same Level of Difficulty in the Chinese ASQ:INVENTORY Domains*

Domain	Item Difficulty	Item Number	% in Estimated Items
CM	10.53	#44, #51, #52, #56	7.7%
	9.83	#45, #46, #53, #54, #55	9.6%
	9.42	#47, #48, #49, #50	7.7%
	5.42	#33, #34	3.8%
	5.33	#32, #35	3.8%
GM	-3.86	#9, #10	4.3%
CG	10.81	#49, #50, #52, #53	7.7%
	10.11	#47, #51	3.8%
	9.70	#45, #46	3.8%
	8.45	#42, #43	3.8%
	8.17	#36, #41	3.8%
PS	10.58	#48, #50	3.7%
	9.88	#47, #49, #51, #52, #53, #54	11.1%
	8.59	#42, #44	3.7%
	8.21	#39, #43	3.7%
	1.32	#22, #23	3.7%

Note. CM = Communication, GM = Gross Motor, CG = Problem Solving, PS = Personal-Social

It is worth noting that in the Gross Motor domain, 2 items (i.e., from #9 and #10) shared an identical estimate of item difficulty (i.e., -3.86). Item #9 asked, "*While your baby is on her back, does she bring her hands together over her chest, touching her fingers?*" Item #10 asked, "*While your baby is on his back, does your baby lift his legs high enough to see his feet?*" More than 600 children scored either "2" or "1" on these two items, with a median age of 14 months. The identical item difficulty estimates should not be explained by lack of variance in respondents. Instead, when looking into the questions in these two items, the targeted behaviors might be highly related. Both items required putting the child in the same face-up lying position; item #9 focused on hand movements while item #10 focused on leg movements. The identical item difficulty estimates might be due to the small sample size in general. In future research, it would be helpful to collect more data on children with motor disabilities to examine the discriminative function of this item. For example, for children with delays in hand movements, do they also score low or higher on item #10? It is also possible that the two skills targeted on these items actually have the same level of difficulty.

Item order. The item difficulty estimates from IRT analyses provided implications for how to order the Chinese ASQ:INVENTORY items to maximize its accuracy. Specifically, when items are ordered from the easiest to the hardest, the "basal" and "ceiling" rules for starting and ending the assessment have the highest efficiency. When some items are more difficult than the earlier items, there is a risk of children not receiving a score on this easy item because they reached the "ceiling" (i.e., four consecutive "0" points) with the earlier items. The Chinese ASQ:INVENTORY retained

the same item order as the English version. Not surprisingly, 15 items (6%) were found to be either easier than the previous three items, or harder than the next three items. Among them, 14 were difficult items representing more advanced level skills (i.e., item order after 40), which, as discussed in the "item difficulty" section, did not have a sufficient number of respondents to generate accurate estimates on item difficulty. Thus, it is suggested to rearrange the order of only one item based on the findings of this study, item #19, "*Does your child poke at or try to get a crumb or Cheerio that is inside a clear bottle (such as a plastic soda-pop bottle or baby bottle)?*" Detailed information on items with detected noteworthy change in order is provided in Appendix F.

Item fit. The majority of items showed *overfit,* based on both weighted and unweighted fit MNSQ, which indicated that the responses were overly predictable. A possible explanation was that collapsing the original three level scoring (i.e., 0, 1, 2) into two (i.e., 0, 1) might have reduced variability in responses. However, high predictive functioning of items may be an advantage rather than a limitation of the Chinese ASQ:INVENTORY, since the items were designed and organized intentionally to reflect the hierarchy of child development. It was expected that younger children were not receiving scores on the later items, and vice versa. Although not found in the weighted fit MNSQ, *underfit* was detected from unweighted fit MNSQ on two items, item #17 in Communication (CM#17) and item #9 in Problem Solving (CG#9). This indicated that these two items were not sensitive to responses from children for whom this item was either too easy or too hard. Specifically, children with a lower developmental level might stop crying when they hear a voice other than their parents' (CM#17), and pick up a toy and put it in mouth (CG#9); children with advanced skills might not perform these

behaviors.

Research Question 2: Does the Chinese ASQ:INVENTORY yield consistent assessment results?

Internal consistency. The Cronbach's alpha coefficients ranged from .96 to .97 indicating high internal consistency in the five domains of the Chinese ASQ:INVENTORY, much higher than reported on the ASQ-C (Bian et al., 2012). This was not surprising given the number of questions in each domain. However, it is worth mentioning that Cronbach's alpha was calculated from datasets with items using the basal and ceiling rules. For example, a 7-month old baby, Xiaomei, started the Problem Solving assessment at item #6 and ended the actual scoring at item #17. According to the basal and ceiling rules, items #1-5 were given an assumed score of "2" and items # 18-68 received a score of "0". It was possible that for some children, some assumed scores were false. Thus, Xiaomei might be able to score "1" on item #20, but was not given the opportunity because #20 was after her ceiling point. Therefore, the high internal consistency coefficients could have been inflated by these assumed scores.

Results from Pearson correlational analyses indicated high and significant correlations across five domains in the first year of life, and also significant but relatively lower (above .80) correlations in the second year. During the interviews, pediatricians reported that caregiver report provided the majority of information when assessing young babies, while direct testing and observations were primary sources of information with older children. Differences in administration procedures might have impacted the domain correlations. In both age levels, the lowest correlation coefficients were found between Communication with both motor domains (i.e., Gross Motor and Fine Motor), which is

reasonable given the distinct nature of communication development and motor development. However, Problem Solving was found to be highly correlated with Fine Motor and Gross Motor, which might indicate that many items in these three domains required skills also found in other domains. For example, children with low motor skills might have difficulty carrying out directions or imitating actions, therefore scoring low on many Problem Solving items. Future research is needed to examine the conceptual structure underlying the Chinese ASQ:INVENTORY items, as well as item functioning.

Test-retest reliability. Results from two administrations resulted in highly reliable scores above .90, which were higher than reported on the ASQ-C (Bian et al., 2012). Generally, scores from the second administration were slightly higher than the first. One possible reason was that the administrator (i.e., pediatrician) became more familiar with the child at the second administration and therefore was able to elicit behaviors that were not performed during the first administration. Another explanation was that the child obtained new skills between the two assessments, which is not surprising given rapid development at this age.

Research Question 3: How accurate is the Chinese ASQ:INVENTORY in measuring child development?

Concurrent validity. Results from Pearson correlational analysis indicated significant agreement between scores from two measures, the Chinese ASQ:INVENTORY and the Beijing GDS. Specifically, strong correlations ranging from .74 to .89 were found in Gross Motor, Fine Motor, Problem-Solving/Adaptive, and Personal-Social domains, indicating that the items measured very similar skills on the two tests. A relatively lower correlation, yet still significant, was found in the

Communication/Language domain. A possible explanation was that items in the Communication domain of Chinese ASQ:INVENTORY were measuring somewhat different behaviors than measured on the Language domain in Beijing GDS. For example, the behavior described in Communication item #2 in the Chinese ASQ:INVENTORY, "*After you have been out of sight, does your baby smile or get excited when she sees you?*" was not included in the Beijing GDS.

Known-groups validity. Results from ANCOVA (see Appendix E) indicated significant differences in the Chinese ASQ:INVENTORY domain scores between children with identified typical development and those with disability diagnosis. However, a majority (25, 66%) of children with known disabilities were assessed via phone interviews with their parents, rather than face-to-face visits in the clinics. Different administration formats might have impacted the results. For example, when caregivers were not sure about their child's performance, the pediatrician could observe or interact with the child during a visit, but this could not happen when talking on the phone. In addition, the sample size of 38 children with known disabilities and 44 children with identified typical development was too small to conduct further examinations on the validity in specific disability categories, such as children with motor disability or autism.

Classification agreement. If users calculate domain screening scores by extracting and summing the item scores the ASQ-C, the Chinese ASQ:INVENTORY can be used for screening purposes and to generate screening results (i.e., need to be referred for further assessment, no need to be referred). The sensitivity, specificity, true positive value, and true negative value between the known disability status and the screening results were higher than, or similar to what has been reported on the ASQ-C (Bian et al.,

2012). Generally, the Chinese ASQ:INVENTORY screening classification had excellent sensitivity, specificity, true positive and true negative value in Communication, Problem Solving and Personal-Social domains, while the classification agreements were relatively lower in Fine and Gross Motor, yet still above .70. This indicated the Chinese ASQ:INVENTORY screening results accurately discriminated children with disabilities from those who were typically developing in Communication, Problem Solving and Personal-Social domains, while was less accurate but acceptable in Gross Motor and Fine Motor domains.

Research Question 4. Are there differences in the responses across China and the U.S.? On which items do differences occur?

Most items (80%) in the Chinese ASQ:INVENTORY appeared on different age intervals of the ASQ-C, a published developmental screening measure with evidence for cultural appropriateness and psychometric properties (Bian et al., 2013). Sixty-five (20%) newly added items were translated and adapted following the ITC Guidelines (ITC, 2010) for cross-cultural translation and adaptation of assessment instruments. First, items were translated to Simplified Chinese with cultural considerations and adaptations; then they were back-translated to English for comparisons and more adaptations; and finally they were tested in both the original (i.e., U.S. children) and the targeted (i.e., Chinese children) populations to identify possible challenges to cultural appropriateness. Resulting from the translation and back-translation procedures, 29 ASQ:INVENTORY items (47%) were adapted, using three types of adaptations including changing measurement units, adapting the examples, and adapting the targeted behavior (see Chapter III). Feedback from Chinese caregivers and pediatricians indicated that the

Chinese ASQ:INVENTORY items, including the newly translated ones, were easy to understand and targeted critical skills for the age of the child being assessed. This provided initial evidence for cultural appropriateness; it appeared that Chinese ASQ:INVENTORY items were translated in a linguisticly appropriate way, and were considered well representative of the developmental range of Chinese children ages from one to 25 months.

DIF. The finding that 83% of examined items showed high levels of DIF indicated that in general, ASQ:INVENTORY items had different scoring patterns in China and the U.S. When looking at each specific domain, patterns of differences were found. For example, in Communication, Fine Motor and Problem Solving domains, there were none or just one DIF item that favored Chinese children, that is, the item was easier for children in China. In Gross Motor and Personal-Social domains, DIF items that favored U.S. children were generally measuring earlier developmental skills (i.e., item ordered early on the scale), while DIF items targeting higher developmental skills often favored Chinese children. There was a higher likelihood for children in China to receive either a partial ("1") or a full ("2") scores on higher developmental skill items in Gross Motor and Personal-Social areas, while generally U.S. children were more likely to score higher on most items in Communication, Fine Motor and Problem Solving domains.

Results from the DIF analysis indicated a slightly different pattern at the item level in Gross Motor and Personal-Social domains, in which items representing lower developmental skills (i.e., earlier in order) were often in favor of U.S. children, while items measuring higher developmental skills (i.e., later in order) generally were in favor of Chinese children. This finding was partially consistent with the results from Chen's

study (2013), in which harder items were in favor of Taiwanese children when compared with children from the US, except in Communication and Personal-Social domains. Findings from this study indicated that compared to children in the U.S., Chinese children were more likely to receive a partial ("1") or full ("2") score on more difficult items in Gross Motor and Personal-Social areas of development. However, children from the U.S. generally received higher domain scores than Chinese children.

CTT. Results from CTT analyses using the ASQ:INVENTORY domain scores provided possible explanations for detected DIF at the item level. Specifically, significant differences in domain scores were found in all domains, with a consistent pattern of children's scores from the U.S. higher than Chinese scores, despite that some higher skill items in Gross Motor and Problem Solving domains favored Chinese children. This might help explain that the majority of items (83%) detected with large level DIF, and that most DIF items (84%) were in favor of (i.e., more likely to be scored a "1" or "2" by) U.S children.

It is worth noticing in the 2-month interval that significant differences were found in four out of five domains, and the differences were large. For example, there was a 12-point difference between the mean scores in Communication. One possible reason is the differences in age between two countries. Using an independent t-test analysis, results indicated that children in the U.S. sample (M = 2 months 9 days) were significantly older than children in the Chinese sample (M = 1 month 18 days). Children develop rapidly in the first few months. In three weeks, they could have learned more skills which resulted in significantly higher scores.

Results from both the DIF and CTT analyses indicated a violation of the

equivalence of the translated Chinese ASQ:INVENTORY. One possible reason was the differences in completion methods and raters. ANCOVA results (see Appendix B) indicated that different completion methods (i.e., paper-pencil and on-line) were associated with differences in the ASQ:INVENTORY domain scores. However, when comparing data collected with the same paper-pencil method, Chinese scores were still significantly lower than U.S. scores. One possible explanation focuses on the collaborative relationships between the rater and the caregiver in the assessment process. When assessing infants and toddlers in a clinical setting, it could be challenging to elicit their actual performance because the child may be behaving differently in an unfamiliar environment with unfamiliar people (i.e., the pediatrician). Collecting indirect data from caregivers who are knowledgeable about their child is thus an important way to compensate the limitations of clinical assessment (Bagnato et al., 2010). However, collaborating with caregivers was a new approach to administering developmental assessment in China. Chinese pediatricians could have underestimated children's skills if they had difficulty communicating with caregivers or did not trust caregivers' report. Researchers in the U.S. might have had more experiences and training on collaborating with caregivers in the assessment process, therefore utilized more reported information about the child's natural performance in everyday life.

Another possible reason was that children might develop differently in the two countries. Some skills might be attained earlier in one country than another. Differences in parenting, expectations of child development, and family routines could have provided varied opportunities for young children to learn and practice the skills targeted in the ASQ:INVENTORY. Future research is needed to investigate how Chinese children

develop, as well as Chinese professionals' perceptions and practices regarding collaborating caregivers in the assessment process.

The differences in item response pattern resulting from the DIF analysis indicated that children with the same underlying developmental level might possess different skills, as discussed in Salvia et al. (2013). Even though most children eventually reach similar developmental milestones, they might acquire them in different sequences based on available learning opportunities, family culture, and parents' expectations.

Research Question 5. How do pediatricians and caregivers/parents in China perceive the usefulness of the Chinese ASQ:INVENTORY?

Based on the results from the utility survey and interviews, most caregivers and pediatricians reported positive experiences with the ASQ:INVENTORY. They rated the Chinese ASQ:INVENTORY items as highly representative of critical skills and the information collected as useful, as well as providing feedback on the advantages and disadvantages of the tool. Results from the utility study will be helpful for future adaptation, dissemination and distribution of the Chinese ASQ:INVENTORY.

Time for administration. Information collected from caregivers and pediatricians indicated that completing all five domains of the Chinese ASQ:INVENTORY took approximately 15-30 minutes for children under one year old, and up to 70 minutes for older children. It required considerably less time than reported for the Beijing GDS, which took 40 to 120 minutes (Liang, 2016). On the other hand, as reported by some pediatricians, while it took longer to complete the ASQ:INVENTORY than the ASQ-C, the former provided more information about a child's development, especially about higher level skills. It is reasonable to conclude that the Chinese

ASQ:INVENTORY required more time than the ASQ-C and less time than the Beijing GDS, but collected more information than the ASQ-C.

Critical skills in child development. The most often reported strength of the Chinese ASQ:INVENTORY was that it tested a comprehensive series of developmental skills representing children at different levels of development. Most caregivers and pediatricians reported that the items were critical skills and representative of the age of the child being assessed. Pediatricians reported that as they observed children and interviewed caregivers in order to complete the ASQ:INVENTORY, items were educative in terms of helping caregivers learn more about what children do at certain ages, what their own child can and cannot do, and what activities they can do with their child at home to encourage developmental growth.

Parent involvement. The second most often mentioned strength was the parent friendly feature of the Chinese ASQ:INVENTORY. Pediatricians reported that the questions were easy for parents to understand, and opened a way for parents to talk about their concerns about the development of their child. Most parents reported being involved and listened to during the assessment, and they felt the pediatricians took their considerations seriously.

Usefulness. Both caregivers and pediatricians reported that the Chinese ASQ:INVENTORY collected important information about a child's development, which was helpful for their parenting and/or clinical practices. Almost all caregivers would like to recommend this tool for future use, and nearly a third of pediatricians provided suggestions of how to implement the tool in their clinics. According to pediatricians' reports, the major barrier to successful implementation was the short clinical visit time

(i.e., 5 minutes). One pediatrician suggested developing a digital application version of the Chinese ASQ:INVENTORY to facilitate more efficient administration.

Advantages and disadvantages. According to the reports from pediatricians, the Chinese ASQ:INVENTORY collected comprehensive and useful information about child development, was easy for parents to understand and be involved with, was easy to administer, and provided engaging activities that were attractive to children. These advantageous features were discussed in the previous sections.

For disadvantages, they reported the length of administration time, challenges when working with some parents, questionable quality of parent report, and different wording on the ASQ:INVENTORY than on some ASQ-C items. As summarized in Table 19 in Chapter IV, their comments reflected the unique features of the ASQ:INVENTORY such as parent friendly, child friendly, and flexibility in administration. In terms of the reported disadvantages, the length of administration was highlighted with considerations related to the purpose of assessment. When aiming for screening classification (i.e., which child should be referred for further evaluation and which should not), it is not surprising that the ASQ-C is quicker and more cost-effective. However, results from this study indicated better internal consistency, test-retest reliability, sensitivity, specificity, true positive value, and true negative value for the Chinese ASQ:INVENTORY, when compared to the reported psychometric properties of the ASQ-C (Bian et al., 2012). It was not surprising that pediatricians found it challenging to work collaboratively with caregivers during the assessment process, and that they questioned the quality of caregivers' reports on their child's development. Involving caregivers in the assessment process is a new idea to these pediatricians and they were not trained in skills for working

with caregivers. Their feedback indicated a need for in-service training for communicating and working with caregivers, which is critical to successful implementation of the Chinese ASQ:INVENTORY. Finally, the differing wording of some items on the Chinese ASQ:INVENTORY as compared with the ASQ-C may have resulted in some items worded somewhat differently in the scoring instructions. For example, item #30 in Gross Motor is "*If your child already kicks a ball, mark 'yes' for this item*". In the ASQ-C, these criteria were translated directly from English for "*mark 'yes'*", "请选择‘是的’". In the new items on the Chinse ASQ:INVENTORY, criteria were translated into scoring instruction, "请打‘2’分'," which means "*please score a '2'*." This was a mistake resulting from a poor translation and failure to carefully edit. Future versions of the Chinese ASQ:INVENTORY will revise all criteria using the same wording to avoid confusion.

Limitations of the Study

Sample

Regional sample. As a preliminary study, the normative sample was collected in only one city in Kunshan, China. Generalization of findings to other regions in China needs to be done with caution. Future research is needed to establish a national sample to represent populations from different regions.

Representativeness. As a regional sample, limitations still exist with the demographic characteristics. Children of well-educated mothers and urban locations were over represented. Information about their family annual income was questionable. Future research needs to make an effort to carefully sample in order to better represent the population. For example, sending data collectors to rural areas to recruit children and

families might be one solution.

In addition, the two known-groups of children with identified disabilities (n = 38) and typical development (n = 44) might have represented extremely low development levels and highly advanced development. Given the current shortage in developmental measures and assessment resources in China, it was difficulty to recruit children at the "borderline" – those with mild to modest delays and those whose development falls within the average range but close to the lower end. Findings from this study may not apply to the "borderline" populations.

Sample size. The small size of the Chinese normative sample was a barrier to conducting analyses on different groups of children, such as comparing males with females, and children with and without disabilities across age intervals. The small sample size in the U.S. dataset also limited the power of analyses. For example, with a larger sample, it would be possible to compare the Chinese sample with the U.S. sample on several variables, such as age, therefore generating more accurate results from DIF analyses.

Sampling method. The Chinese sample collected data for all five domains on each child, while the U.S. sample collected data for each domain separately. When interpreting results across domains, the Chinese sample allowed within-subject comparison (i.e., domain scores of the same child) but the U.S. data should be considered as between-subject (i.e., domain scores collected from different groups of children). Using a between-subject dataset might have increased the variability in the results.

Self-selection. First, the Chinese sample recruited participants from families attended well-child checkups. The sample might be biased if there was a trait in families

who were more likely to attend regular well-child checkups, such as parents who had concerns of their child's development. In addition, the caregiver survey sample was collected solely based on caregivers' willingness to participate. Caregivers who had had positive experiences with research and assessment might have been more willing to complete the survey than those who had had negative experiences. Therefore, consideration of sampling bias should be considered when interpreting results from the caregiver survey.

Completion Methods

The two different completion methods (i.e., paper-pencil and on-line) in the U.S. sample added a significant factor that impacted the scores across five domains. Findings indicated that using the same completion method (i.e., paper-pencil), differences still existed between two countries. However, the cross-country analyses in this study used a U.S. sample completed by both paper-pencil and on-line methods to ensure sufficient sample size. Therefore, the interpretation of cross-country differences needs to consider the impacts from both country and completion method.

Implications

For Researchers

Findings from this study will contribute to the body of knowledge about cross-country translation and adaptation of early childhood assessment. Translated instruments need careful examination to identify cultural appropriateness and test adequacy (Hambelton et al., 2005). As Canino and Bravo (1999) suggested, examination of translation equivalence needs to address the semantic (e.g., whether the meaning of items is consistent across countries), content (e.g., whether the targeted skills represent critical

developmental milestones of Chinese children), technical (e.g., reliability), conceptual (e.g., validity) and criterion considerations (e.g., how well the normative sample is representing Chinese children).

For the newly added 65 items in this study, semantic equivalence was addressed by using a translation and back-translation procedure to ensure linguistic accuracy of the translated version. For all the items on the Chinese ASQ:INVENTORY, content equivalence was supported by feedback from caregivers and pediatricians that the items measured critical skills of the child being assessed. Technical equivalence was examined using interval consistency and test-retest reliability measurements, as well as analyses on completion methods. Conceptual equivalence was supported by findings from concurrent validity, known-groups validity, IRT item fit results, and reports from caregivers and pediatricians. Criterion equivalence was addressed by developing a regional normative sample in China, that provides developmental information of Chinese children for the interpretation of assessment results on the Chinese ASQ:INVENTORY.

For researchers interested in young children's development in China, this study provides a comprehensive measure with solid evidence on its psychometric properties and cultural appropriateness. For researchers who are interested in using the ASQ:INVENTORY to compare child development across China and the U.S., findings from this study can be helpful to the understanding of assessment results with careful consideration of possible violation of cultural equivalence.

For Practitioners

For developmental pediatricians in China, this study provided high quality, low cost alternatives for developmental assessment. The Chinese ASQ:INVENTORY as

examined in this study showed adequate evidence for reliability, validity and utility in identifying Chinese children with developmental delays. Results indicated that the Chinese ASQ:INVENTORY includes a wide range of skills that cover children from very low to advanced development, and information collected is valuable for making clinical decisions. Reported advantages of the Chinese ASQ:INVENTORY included easy administration, less time needed than the Beijing GDS, and parent and child friendliness. As Hu and Yang (2013) pointed out, developmental diagnostic resources are still scarce in China. Lacking a documented eligibility measure has been a major barrier for identifying young children who could benefit from early intervention. The convenience feature of the Chinese ASQ:INVENTORY provides a promising instrument for assisting diagnostic decisions when a standardized assessment is not feasible, as is often the case currently.

The parent-friendliness of the Chinese ASQ:INVENTORY also provided a new format for implementing developmental assessment by respecting and involving parents in the evaluation process, which lays a solid foundation for active family involvement in any subsequent intervention services (Hanson & Lynch, 2014). Relying on caregiver report when assessment their child's development is still a new concept in China, and pediatricians in this study still questioned its reliability. Compared with some standardized assessments (e.g., the Beijing GDS) that rely on direct testing, the flexibility in administration procedures (e.g., parent report, observation, direct testing) of the Chinese ASQ:INVENTORY facilitates more collaboration between professionals and caregivers. This feature also allows Chinese practitioners to tailor the administration of the assessment in a way with which both professionals and caregivers feel most

comfortable.

Positive feedback from caregivers provided evidence for the social validity of the Chinese ASQ:INVENTORY. In addition, caregivers and even pediatricians reported that they learned valuable knowledge about child development from administering this tool. This educational feature of the Chinese ASQ:INVENTORY might also be utilized by primary child health care providers in the community for training pediatricians and parents.

The overlapping of the Chinese ASQ:INVENTORY with the ASQ-C potentially supports more efficient assessment practices. As discussed by Bricker and her colleagues (2015), information collected during screening often is not utilized in the eligibility process. When a child's ASQ-C scores indicate concerns and a referral is made for an eligibility assessment using the Chinese ASQ:INVENTORY, existing item scores from the ASQ-C can be used to inform the most efficient starting point of the Chinese ASQ:INVENTORY, as well as to shorten scoring time because of overlapping items. In this way, it is reasonable to estimate needing less time to complete the Chinese ASQ:INVENTORY by obtaining information from earlier screening results on the ASQ-C, if the two assessments take place very close to each other in time (e.g., within a week).

For Administrators

At the system's level, the Chinese ASQ:INVENTORY provides a high quality option to meet the urgent needs in China for a cost-effective, efficient, and accurate early childhood assessment instrument in the nationwide early detection system, as described in the 2013 Guidelines (see Figure 2 in Chapter II). The currently required developmental diagnostic instrument, the Beijing GDS, takes more time and requires more training for

professionals to administer, uses more standardized but less child and family friendly procedures, interprets children's scores based on a normative sample that is outdated, and generates age equivalents instead of standardized scores. Given the large variability in resources across different regions in China, the Chinese ASQ:INVENTORY can be used at different stages in the nationwide early detection system. In communities where diagnostic services are available but still limited, the Chinese ASQ:INVENTORY could be used at the district/county level for secondary screening, to increase the sensitivity and specificity rates in children being referred for diagnostic assessment, therefore limiting diagnostic services to those who are really in need. In communities where diagnostic services are too distant to access, the Chinese ASQ:INVENTORY can still be used at the district/county level, to assist in eligibility decisions. In this way, children whose results indicated concerns during the screening process do not need to make a long trip to capital cities where diagnostic services are available, or to spend months or even years to obtain an eligibility decision. Local district and county child health care providers can use the Chinese ASQ:INVENTORY to determine eligibility in a shorter time period, and start interventions earlier.

Feedback from pediatricians provided valuable information for administrators. The relatively longer time needed for completing the Chinese ASQ:INVENTORY (e.g., 15-70 minutes depending on the child's developmental level) makes it challenging to administer during a typical 5-minute well-child checkup. Pediatricians will not be able to see 30-40 patients in a morning if they are to use the Chinese ASQ:INVENTORY. Therefore, it may be helpful to set up a "developmental assessment" category specifically for this tool.

Future Directions

This preliminary study examined the Chinese ASQ:INVENTORY with a regional sample in China; results supported the psychometric properties and utility of this newly translated tool. Findings from this study will be used to inform updating of the Chinese ASQ:INVENTORY in item order and wording. Future directions for research are suggested including developing a national sample, testing in child care settings, developing a digital version, and evaluating the progress monitoring and evaluation functions of the tool.

National Sample Ages from 1-36 Months

Findings from this study, including the percentile scores for each domain, were based on a regional sample collected in Kunshan. In order to facilitate the distribution and implementation of the Chinese ASQ:INVENTORY in China, a national normative sample with a larger sample size is needed. The age range of the sample also needs to be expanded from 1-25 months to 1-36 months, in order to represent most children who have not entered preschool in China.

Child Care Settings

As discussed by Bricker and her colleagues (2015), different service systems in the same community often conduct separate screening assessments on children, which can be redundant for families and wasteful of resources. The easy to use and flexible administration procedures of the Chinese ASQ:INVENTORY provide opportunities for different service agencies in the same community to collaborate and share child developmental information with each other, such as between child health care providers (e.g., maternal and child clinics) and child care providers (e.g., day care centers). Of

course, the use of this tool in child care settings needs to be carefully examined to address considerations about reliability and validity.

Digital Version

One of the pediatricians suggested creating a digital application of the Chinese ASQ:INVENTORY to increase the ease of use and reduce the time needed for administration. Given the results in this study, scores can be very different when completed using different methods. Therefore, if a digital version is developed, research is needed to examine the impact of different completion formats on scoring, in order to ensure accurate interpretation of assessment results, especially when comparing results across completion options.

Using the Chinese ASQ:INVENTORY for Progress Monitoring

The wide range of developmental skills measured by the Chinese ASQ:INVENTORY items enables using this tool to monitor child progress across time. As pointed out by Hu and Yang (2013), progress monitoring and outcome evaluation are not common practices in early intervention in China. Future research is needed to provide evidence for the technical adequacy for using the Chinese ASQ:INVENTORY to monitor progress in the early intervention system in China.

Conclusion

As described in Chapter II, the 2013 Guidelines proposed a nation-wide early detection system aiming to identify 0-6 year old children with disabilities in China (CCDCP, 2013 a). However, using a standardized measure to diagnose developmental delays (i.e., the Beijing GDS), as required in the 2013 Guidelines, faces challenges from the lack of trained personnel and other resources in the system, as well as from the

questionable quality of the Beijing GDS. Furthermore, the shortage in personnel is expected to increase rather than decrease in the near future. In 2014, the number of visits to pediatric clinics increased by 6.6%, while the number of pediatricians decreased by 16% (National Bureau of Statistics of China, 2015). Therefore, it would be more feasible to adopt a non-standardized developmental measure that requires less time to administer while collecting comprehensive information about a child's development to inform accurate diagnostic decisions. A solution is proposed to bridge the gap between the limited resources at pediatric clinics and need for early identification of children with disabilities by translating and validating a new developmental assessment instrument, the Chinese ASQ:INVENTORY.

This preliminary study examined the Chinese ASQ:INVENTORY with a regional sample of Chinese children and caregivers, as well as established initial evidence for reliability, validity, cultural appropriateness and utility. Findings suggested that the Chinese ASQ:INVENTORY collects information about critical developmental skills, which is valuable in clinical decisions on children's developmental status. Caregivers and pediatricians in China reported pleasant and meaningful experiences in using this tool, as well as a reduction in the administration time when compared with the Beijing GDS. Fifteen Chinese pediatricians, who were the data collectors in this study, provided suggestions for future implementation of the Chinese ASQ:INVENTORY at child health care clinics. Implications for researchers, practitioners and administrators, as well as directions for future research are provided based on the results.

Findings suggest that the Chinese ASQ:INVENTORY can be a promising tool for identifying young children with disabilities in China. It was found to be child-friendly,

parent-friendly, and cost-effective. Pediatricians will benefit from its easy to use feature and comprehensiveness in measuring child development. Caregivers who participate in the Chinese ASQ:INVENTORY assessment process will learn about what their child is able to do, as well as the skills that are critical to the development of same age children. Using the Chinese ASQ:INVENTORY in the national early detection system, developmental information can be shared across different stages of assessment (e.g., screening and eligibility determination), cost for developmental assessment can be reduced, families in rural counties can easily access local professionals for diagnostic assessment. Future research on the broad-based dissemination of the Chinese ASQ:INVENTORY is needed to address possible challenges and needs in the implementation process.

APPENDIX A

DATA COLLECTION FORMS:

CHINESE ASQ:INVENTORY, ENGLISH ASQ:INVENTORY, CAREGIVER QUESTIONNAIRE, AND PEDIATRICIAN INTERVIEW SCRIPT

年龄与发育进程问卷®跨龄版
ASQ-INVENTORY

评估者编号：

本次评估日期：　　年　　月　　日　　**初测**　**复测**

儿童信息

姓名：　　性别：　男　女　　出生日期：　　年　　月　　日

如果是早产（提前 3 周以上出生），请填写宝宝的孕周：　　周　　天

民族：　　出生时体重是否低于 1.36 千克（低体重）？　否　是

是否已诊断为患有某种残疾，或发育迟缓？　否　是　（如果是，请说明具体诊断）

是否正在接受早期干预/康复治疗？（例如，言语治疗、行为干预、特殊教育等）　否　是
（如果是，请说明具体情况）

家庭信息

母亲的教育水平：① 高中以下　②高中毕业　③大专　④本科　⑤不知道

母亲在孩子出生时的年龄：　　岁

参与本次评估的家长是：① 母亲　② 父亲　③ 父母双方　④（外）祖父母
⑤ 其他法定监护人　⑥ 寄养父母　⑦领养父母　⑧ 教师/保姆　⑨其他人
（请说明）

家庭户籍所在地：　　户籍类型：　城市　农村

家庭平均每人**年**收入：
① 6000 元以下　② 6000-12000 元　③ 12000-30000 元　④ 30000 元以上

家中常住人口数量：　　人

ASQ-I 跨龄版

粗大动作

打分规则
2 分 = 总是做到
1 分 = 有时/部分做到
0 分 = 从不或偶然做到

使用说明

接下来的 5 套问卷，是询问宝宝的日常表现。请按按照孩子的年龄选择对应起测点，开始评估。"下限"或"上限"不完整，为无效数据，将不予录用。请确保完整的"下限"与"上限"：

下限：实际打分的头四条题目连续得"2"分。如果起测点之后四题内有得"1"或"0"分者，则需回到起测点之前的题项，倒序评估，直到连续四题得"2"分；

上限：实际打分的最后四条题目连续得"0"分方可终结。

请确保孩子在睡足吃饱的时候接受评估，并尽量用游戏的方式与孩子自然互动。

粗大动作能区

打分 *1-3 个月起测点*

☐ 1 当宝宝面朝上躺着时，他/她能挥动双腿和双臂并晃动和扭动身体吗？1-2

☐ 2 当宝宝面朝上躺着时，他/她能踢双腿吗？4-2

☐ 3 宝宝趴着、抬着头时，他/她能把头向下放回到床上或地板上，而不是无力地跌落或垂落到床上或地板上吗？ 6-2

☐ 4 当将宝宝面朝下趴着时，他/她能抬起头并持续几秒钟吗？3-2

3-6 个月起测点

☐ 5 当宝宝面朝上躺着时，他/她能将头转向两侧吗？ 5-2

☐ 6 当将宝宝面朝下趴着时，他/她能把头转到侧面吗？ 2-2

☐ 7 当您抱着宝宝坐着时，他/她能稳稳的抬着头吗？5-4

6-9 个月起测点

☐ 8 当宝宝面朝下趴着时，他/她能抬头使下巴离开地板或床面约 7.5 厘米并持续至少 15 秒吗？3-4

☐ 9 当宝宝面朝上躺着时，他/她能将双手移到胸前并触到另一只手的手指吗？6-4

☐ 10 当宝宝面朝上躺着时，他/她能抬起腿、看到自己的脚吗？1-6

☐ 11 当宝宝面朝下趴着时，他/她能竖直头（可能是用手臂支撑着身体）朝周围看吗？4-4

☐ 12 当把宝宝放在地板上坐着时，他/她能用手撑着地面坐吗？如果不用手支撑就已经能坐直，也请打 2 分。4-6

9-12 个月起测点

☐ 13 当您抓着宝宝的双手帮他/她保持平衡时，他/她能承受自身的重量站直吗？5-6

ASQ-I 跨龄版

粗大动作

打分规则
2 分 = 总是做到
1 分 = 有时/部分做到
0 分 = 从不或偶然做到

提示：连续四题打“0”分即可终结本能区评估。

☐ 14 宝宝趴着时，他/她能伸直双臂支撑使整个胸部离开床面或地面吗？2-6

☐ 15 宝宝面朝上躺着时，他/她能分别从左、右两侧翻身到趴在床上并将压在身下的手臂抽出来吗？3-6

☐ 16 当宝宝坐在地板上时，他/她不用手支撑就能坐直几分钟吗？5-8

☐ 17 宝宝能做出用手和膝支撑身体的爬行姿势吗？6-6

☐ 18 当您让宝宝扶着家具或婴儿床的围栏站着时，他/她的胸部能不靠着家具或婴儿床的围栏吗？6-8

12-18 个月起测点

☐ 19 当您抓着宝宝的双手帮他/她保持平衡时，他/她能走几步而不绊跌或摔倒吗？如果他/她已经能独走，也请打 2 分。4-12

☐ 20 当宝宝用手扶着家具站着时，他/她能有控制地下蹲或坐下而不摔倒或瘫软到地上吗？5-10

☐ 21 当宝宝用手扶着家具时，他/她能弯腰从地板上捡起玩具，然后再站立起来吗？4-10

☐ 22 宝宝能只用一只手扶着家具并沿着家具走吗？6-10

☐ 23 当您抓着宝宝的一只手帮他/她保持平衡时，他/她能向前走几步吗？如果他/她已经能独走，也请选择“是”。5-12

18-24 个月起测点

☐ 24 宝宝不用任何扶持就能弯腰或蹲下从地板上捡起东西，然后再站起来吗？5-14

☐ 25 宝宝能爬上沙发或椅子吗？4-14

☐ 26 宝宝能自己从地板上站起来并向前走几步吗？6-12

☐ 27 宝宝更多是走而不是手膝位爬在周围活动吗？6-14

☐ 28 孩子走得稳并很少摔倒吗？5-16

24-30 个月起测点

☐ 29 如果孩子想拿台子上的玩具或在厨房帮您的“忙”等时，他/她会爬上椅子等物体去拿他/她想要的东西吗？6-16

☐ 30 您给孩子示范踢球后，他/她能向前移动他/她的腿或像走路一样碰上球来“踢球”吗？如果他/她已经能踢球了，也请打 2 分。6-18

☐ 31 孩子能自己上或下至少两阶楼梯（可以一只手扶着墙壁或楼梯扶手）吗？6-20

ASQ-I 跨龄版

粗大动作

打分规则
2 分 = 总是做到
1 分 = 有时/部分做到
0 分 = 从不或偶然做到

提示：连续四题打“0”分即可终结本能区评估。

☐ 32 如果您牵着孩子的一只手或他 / 她的一只手扶着楼梯扶手或墙壁，他/她能下楼梯吗？5-18

☐ 33 孩子能跑得很稳，并且停下来时不会碰到东西或摔倒吗？5-20

30-36 个月起测点

☐ 34 不扶着任何东西，孩子能向前摆动他/她的腿踢大球吗？ 6-22

☐ 35 不给予帮助，孩子能自己爬上溜滑梯的梯子，并且滑下来吗？6-42

☐ 36 孩子能双脚同时离地跳起来吗？5-22

☐ 37 当孩子站着时，他/她能举球过肩将球向前扔出去吗？若球掉下或扔球时手不过肩，请打 0 分。6-33

☐ 38 孩子能左右脚交替着（双脚不在同一梯阶）上楼梯（可以一只手扶着墙壁或楼梯扶手）吗？6-27

36-45 个月起测点

☐ 39 孩子能双脚同时离地、向前方跳至少 7.5 厘米远吗？5-27

☐ 40 不扶任何东西，孩子能单脚站立约 1 秒钟吗？6-30

☐ 41 当孩子站着时，他/她能举球过肩地将小球投向站在距他/她至少 180 厘米远的人吗？若球掉下或扔球时手不过肩，请打 0 分。3-48

☐ 42 孩子能用脚尖走（即踮脚走）450 厘米（约一辆轿车的长度）吗？您可以示范。

☐ 43 您站在距孩子约 150 厘米的地方，向他/她投掷大球时，他/她能用双手把球接住吗？可以试 2-3 次。5-42

☐ 44 孩子能双脚同时离地、向前方跳至少 15 厘米远吗？6-36

45 个月以上起测点

☐ 45 孩子能踩着一条直线走 10 步以上吗？10p

☐ 46 孩子能左右脚交替着走下楼梯吗？17p

☐ 47 不扶任何东西，孩子能单脚站立（不让另一只脚着地），并且身体不失去平衡至少 5 秒钟吗？可以试 2-3 次。6-48

ASQ-I 跨龄版

粗大动作

打分规则
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提示：连续四题打“0” 分即可终结本能区评估。

☐ 48 孩子能用任一单脚跳至少一次，并且身体不失去平衡或摔倒吗？4-48

☐ 49 孩子能在跑步时改变奔跑的方向，而且边跑边踢球吗？例如在玩足球的时候。3p

☐ 50 给孩子示范如何用一只脚的脚尖贴着另一只脚的脚跟走路，孩子能用这种方式向前走至少 10 步吗？12p

☐ 51 孩子能单脚不停跳着前进至少 60 厘米的距离吗？7p

☐ 52 孩子能跳起来在空中转身、改变落地方向吗？8p

☐ 53 孩子能原地单脚跳三次吗？6p

☐ 54 站立、双脚并拢的情况下，孩子能双脚同时离地、向前方跳至少 50 厘米远吗？5-48

☐ 55 孩子能接住从 1.5 米之外扔过来的一颗小球（大小与网球相似）吗？19p

☐ 56 要求孩子重复以下成套的三个动作：跑步—双脚跳—单脚跳。孩子能完成全套动作至少两次吗？9p

☐ 57 站立、双脚并拢的情况下，孩子能双脚同时离地、向前方跳至少 90 厘米远吗？4p

☐ 58 如果你示范如何把一只脚的脚尖贴着另一只脚的脚跟，倒着走路，孩子能用这种方式倒退着走至少 10 步吗？ 13p

☐ 59 孩子能两只脚交替蹦跳着走吗？您可以示范。 6-60

☐ 60 孩子能先用右脚单脚向前跳 5 步，然后换左脚单脚向前跳 5 步吗？ 5p

☐ 61 孩子能用一颗如网球大小的球投中挂在 1.5 米之外、与视线同高的靶子吗？20p

☐ 62 孩子能单脚向前跳行 120—180 厘米吗？双脚分别完成，每只脚可以各试两次。如果仅一只脚能完成，请打 1 分。 5-60

☐ 63 孩子能自己荡秋千吗？他/她需要前后蹬腿推动秋千。14p

☐ 64 孩子能自己蹬没有辅助轮的自行车，骑 6 米远吗？ 18p

☐ 65 孩子能跳绳吗？他/她必须自己把绳子翻过头顶和脚下，并且跳过绳子至少 3 次。 16p

打分规则
2 分 = 总是做到
1 分 = 有时/部分做到
0 分 = 从不或偶然做到

精细动作能区

提示：连续四题打“0”分即可终结本能区评估。

打分　***1-3 个月起测点***

☐ 1　宝宝的手能碰到自己的脸吗？4-2

☐ 2　当您用手指触摸宝宝的手心时，他/她会抓住您的手指吗？2-2

☐ 3　当宝宝醒着时，他/她的双手是全部展开或部分展开(但他/她刚出生时常常是双手握拳)的吗？ 5-2

☐ 4　当宝宝醒着时，他/她的手经常是紧紧地握成拳头吗？如果以前是，但是现在不再是了，也请打 2 分。1-2

3-6 个月起测点

☐ 5　宝宝会抓挠自己身上的衣服吗？ 6-2

☐ 6　当您把玩具放在宝宝手里时，他/她能握一会儿吗？ 3-2

☐ 7　当宝宝被抱着坐着或面朝下趴着时，他/她能用手指抓挠他/她面前的桌面或床面吗？5-4

☐ 8　当把玩具放在宝宝手里时，他/她会抓住玩具玩（可能是看、摇或啃玩具）1 分钟左右吗？ 4-4

☐ 9　当您递给宝宝玩具时，他/她会抓过来并且注意看、挥动或用嘴啃玩具，持续约 1 分钟吗？1-6

6-9 个月起测点

☐ 10　当宝宝被抱着坐着时，他/她会伸出手去抓放在他/她附近桌子上的玩具（可能碰不到玩具）吗？ 6-4

☐ 11　宝宝能只用一只手拿起小玩具吗？ 6-6

☐ 12　宝宝同时伸出双手去拿或抓住玩具吗？ 2-6

☐ 13　宝宝拿起小玩具时，是用手指把玩具围在手心里吗？ 4-6

9-12 个月起测点

☐ 14　宝宝能向面包屑、小麦圈或枸杞子等豌豆大小的东西伸出手，并且手指或手能碰到吗？如果他/她已经能拿起豌豆大小的东西，也请打 2 分。 3-6

☐ 15　当宝宝想拿豌豆大小的东西时，他/她是用拇指与其他四指像耙子似地拿吗（无论拿到否）？如果他/她已经能拿起豌豆大小的东西，也请打 2 分。？ 5-6

ASQ-I 跨龄版

精细动作

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提示：连续四题打“0”分即可终结本能区评估。

☐ 16 宝宝能用拇指与其它四指像耙子似地成功地耙起面包屑、小麦圈或枸杞子等豌豆大小的东西吗？如果他/她已经能捡起豌豆大小的东西，也请打 2 分。 5-8

☐ 17 宝宝是用拇指指尖与其它手指的指尖捡起小玩具吗？这时，您应该能看到在玩具和他/她的手掌之间有间隙。 6-8

☐ 18 经过一、两次练习后，宝宝能用食指与拇指捡起绳子吗？这根绳子可以是系在玩具上的。 4-10

12-18 个月起测点

☐ 19 宝宝能用拇指指尖与其它一个手指的指尖捡起面包屑、小麦圈或枸杞子等豌豆大小的东西吗？在做这个动作的时候，手臂或手可以是放在桌子上。 5-10

☐ 20 宝宝能放下小玩具（而不是掉下），然后手离开玩具吗？ 6-10

☐ 21 不将手臂或手放在桌子上，宝宝能用拇指指尖与另一手指的指尖捡起面包屑、小麦圈或枸杞子等豌豆大小的东西吗？ 4-12

☐ 22 宝宝能帮助翻书（您可以帮他 / 她翻起书页）吗？ 6-12

18-24 个月起测点

☐ 23 孩子能自己翻书（可能一次不止翻一页）吗？ 6-16

☐ 24 当学着画时，宝宝能用蜡笔（或铅笔、钢笔）的笔尖在纸上画出痕迹吗？ 5-14

☐ 25 宝宝能将一个小积木（小盒子或线团等约 2.5 厘米大小的小东西）搭在另一个的上面吗？4-14

24-30 个月起测点

☐ 26 孩子会将电灯的开关打开和关掉吗？ 5-22

☐ 27 宝宝能挥动前臂向前投掷小球吗？如果球是从手中掉下，请打 0 分。 5-12

☐ 28 宝宝能自己将 3 个小积木等约 2.5 厘米大小的小东西一个摞一个地搭起来吗？ 6-14

☐ 29 孩子能正面向上地使用勺子将食物送进嘴里，并且食物一般不会撒出来吗？ 6-18

30-39 个月起测点

☐ 30 孩子能自己将 6 个小积木等约 2.5 厘米大小的小东西一个摞一个地搭起来吗？ 5-20

☐ 31 当孩子拧门把、为玩具上发条、转动陀螺或拧瓶盖时，他/她的手能做旋转的动作吗？ 6-20

☐ 32 翻书时，孩子会不会一次只翻一页？ 6-30

☐ 33 您先示范画一个圆圈，然后要他/她也画一个跟您的一样的圆圈。请不要让他/她描您画的圆圈。孩子能模仿画一个圆圈吗？ 5-30

计 2 分

计 0 分

39-54 个月起测点

ASQ-I 跨龄版

精细动作

打分规则
2 分 = 总是做到
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提示：连续四题打“0”分即可终结本能区评估。

计 2 分

计 0 分

☐ 34 您先示范用笔在纸上从上到下画一条线，然后要他/她也画一条跟您一样的线。请不要让他/她描您画的线。孩子能模仿在垂直向画一条线吗？ 3-27

提示：连续四题打“0”分即可终结本能区评估。

计 2 分

计 0 分

☐ 35 您先示范在纸上从一侧到另一侧画一条线，然后要他/她也画一条跟您的一样的线。请不要让他/她描您画的线。孩子能模仿在水平方向画一条线吗？ 6-27

☐ 36 孩子能将中间有洞的小东西（如串珠、麦圈等）穿在绳子或鞋带上吗？ 6-22

☐ 37 孩子会用儿童剪刀剪纸吗？不必把纸剪开，但必须是一只手拿着剪刀并让刀口张开及闭合，另一只手拿着纸。可以给孩子示范如何使用剪刀。孩子用剪刀时，请务必注意安全。 6-33

☐ 38 画画时，孩子能像成人一样用拇指配合其他手指握笔吗？ 6-36

☐ 39 孩子能拼好一个由 5 到 7 片可互相扣合的拼图片组合而成的拼图吗？ 5-42

☐ 40 孩子会解开自己、他人或玩具娃娃衣服上的至少一个纽扣吗？ 4-48

☐ 41 向孩子展示右图，他/她能在纸上画（而不是描）出相同的图形吗？孩子画的图形除了大小可以不同于原图外，形状应该与右图相似。 6-42

☐ 42 让孩子画人时，他/她画的人能有下述 11 个部位中的至少 3 个部位吗？11 个部位：头、两只眼睛、鼻子、嘴、颈、头发、躯干、双臂、双手、双腿、双脚。 5-48

☐ 43 孩子能用一把钝刀切东西吗？例如，用塑料刀切橡皮泥，或用餐刀切香蕉或芒果。孩子用刀子时，请务必注意安全。 8p

☐ 44 孩子用儿童安全剪刀剪纸时，他/她能使剪刀刀口一张一合、基本沿直线将纸剪成两半吗？孩子用剪刀时，请务必注意安全。 2-48

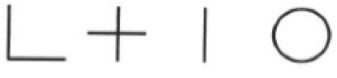
☐ 45 孩子能单手持握至少五张以上的纸牌吗？例如，将纸牌排列成扇子的形状握在手里。 4p

☐ 46 孩子能扣上直径在 1 厘米以上的大纽扣吗？ 6p

☐ 47 乘坐小轿车时，孩子能自己扣上安全带吗？ 12p

☐ 48 让孩子用铅笔描下面的直线，他/她能始终准确地描在线上吗？如果描偏仅 1- 2 次，请打 2 分。如果描偏 3 次，请打 1 分。 4-54

☐ 49



让孩子看这些图形，他/她能用笔在纸上画（而不是描）出至少三个图形吗？孩子画的图形除大小可以不同于原图外，形状应该与原图相似。 3-48

ASQ-I 跨龄版

精细动作

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提示：连续四题打“0”分即可终结本能区评估。

☐ 50 让孩子在一张白纸上画一个人。您可以要求孩子“画个男孩或女孩”。如果孩子画的人有头、身体、双臂和双腿 4 个部位，请打 2 分。如果只有其中 3 个部位，请打 1 分。如果只有 1-2 个部位，请打 0 分。请将孩子画图的纸与本问卷订在一起。 5-54

☐ 51 在涂色画上涂色时，孩子能把大部分颜色都涂在线内，并且超出部分中大多数不超过画框线外半厘米吗？ 6-48

☐ 52 您在一张纸上画一条横跨纸的两边的线。孩子能用儿童安全剪刀，使剪刀刀口一张一合、基本沿这条直线将纸剪成两半吗？孩子用剪刀时，请务必注意安全。 6-54

☐ 53 孩子能在厚纸（例如包装盒）上剪出一条 10 厘米的线吗？ 2p

☐ 54 向孩子展示以下三个图形，孩子能用笔在下面的空白处照样画（而不是描）出这些图形吗？孩子画的图形除大小可以不同于原图外，形状应该与原图相似。如果能照样画出所有三个图形，请打 2 分；如果只能照样画出其中二个，请打 1 分。 4-60

（让孩子画在这里：）

☐ 55 孩子能抄写他/她的名字吗？他/她抄写的字迹可以很大，笔画顺序可以不对。如果孩子能完成抄写一半或更多笔画，请打 1 分。请您将孩子的名字工整地书写在这里 6-60

（把孩子的名字写在这里：）　　（让孩子抄写在这里：）

☐ 56 孩子能侧着用勺子或叉子，将软的食物例如香蕉、芒果等，切成小块吗？ 7p

☐ 57 给孩子一张 A4 大小的纸张（约 20 厘米宽、30 厘米长），要求孩子将两条短边对折。孩子能按要求把纸对折、两条短边相距不到 1 厘米吗？ 10p

☐ 58 孩子能自己系衣服上的大部分纽扣，包括直径小于 1 厘米的小纽扣吗？ 5p

☐ 59 让孩子看以下字母，他/她能照样抄（而不是描）写这些字母吗？您可以只留下正在抄写的字母，把其它的字母遮盖起来。如果孩子能照样抄写其中 4 个字母并且您能辨认它们，请打 2 分；如果只能照样抄写其中 2-3 个字母并且您能辨认它们，请打 1 分。 5-60

（让孩子抄写在这里：）

V H T C A

☐ 60 在纸上画一个直径约 10 厘米的大圆圈，让孩子用儿童剪刀沿着线把圆圈剪下来，孩子能基本沿着线剪，距离画的线不超过半厘米吗？ 1p

☐ 61 孩子能双手配合着吃饭吗？例如，一只手端着碗，另一只手用勺子或筷子从碗中取食；或者，一手持餐刀、另一手持餐叉，将软的食物（例如香蕉、芒果等）切成小块。 9p

☐ 62 孩子能用一把钥匙成功打开锁着的门吗？ 11p

☐ 63 孩子能把鞋带系成一个蝴蝶结吗？ 3p

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解决问题能区

提示：连续四题打“0”分即可终结本能区评估。

打分　*1-3 个月起测点*

☐ 1　宝宝能注视 20-25 厘米远处的物体吗？1-2

☐ 2　当您将玩具在宝宝面前约 25 厘米远处缓慢地从他/她的头部到胸部上下移动时，他/她的眼睛能跟随玩具移动吗？4-2

3-6 个月起测点

☐ 3　当您将玩具在宝宝面前约 25 厘米远处缓慢地左右移动时，他/她的眼睛（有时候包括头）能跟着玩具移动吗？3-2

☐ 4　当您在宝宝周围走动时，他/她的眼睛能跟着您移动吗？2-2

☐ 5　当您将玩具放在宝宝手里时，他/她会注视玩具吗？4-4

6-9 个月起测点

☐ 6　当宝宝被抱着坐着时，他/她会注视您放在他/她面前桌子上或地板上的约杯子或拨浪鼓大小的玩具吗？5-2

☐ 7　当您将玩具放在宝宝手里时，他/她会将玩具放进他/她的嘴里吗？5-4

☐ 8　当宝宝面朝上躺着时，将玩具在他/她的上方晃动，他/她能朝玩具挥舞手臂吗？

☐ 9　宝宝会捡起玩具并放进嘴里吗？4-6

☐ 10　当宝宝面朝上躺着时，如果玩具从他/她的手中掉落，他/她会转动头去寻找玩具吗？如果他/她已经能捡起玩具，也请打 2 分。2-6

☐ 11　当宝宝面朝上躺着时，如果玩具从他/她的手中掉落在他/她看得见的地方，他/她会试着捡玩具吗？3-6

9-12 个月起测点

☐ 12　宝宝会用玩具反复敲击桌子或地板吗？6-6

☐ 13　当将玩具放在宝宝的面前时，他/她会伸出双手去拿玩具吗？1-6

☐ 14　宝宝能将玩具从一只手换到另一只手来回递交吗？5-6

☐ 15　当宝宝拿着一个玩具时，他/她能用它敲击桌子上的另一个玩具吗？6-8

☐ 16　宝宝能每只手各捡起一个小玩具，并握着它们持续大约 1 分钟吗？5-8

ASQ-I 跨龄版

解决问题

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12-18 个月起测点

☐ 17 当宝宝看着您将一个玩具藏在一张纸或一块布下面时，他/她能找到这个玩具吗？注意，玩具必须完全被遮盖着。6-10

☐ 18 当宝宝两只手各拿着一个玩具时，他/她能将两个玩具相互敲击吗？4-10

☐ 19 宝宝能用手指掏或设法拿装在塑料汽水瓶或奶瓶等透明瓶子里的面包屑或枸杞子等豌豆大小的东西吗？5-10

☐ 20 当宝宝被抱着坐着时，他/她会注视您放在他/她面前桌子上或地板上的约杯子或拨浪鼓大小的玩具吗？4-12

☐ 21 宝宝能把 2 个玩具一个接一个地丢入一个碗或盒子等容器里吗？您可以示范。5-12

☐ 22 如果您把瓶子、勺子或铅笔上下颠倒着给孩子，他/她能将之正过来并正确地使用吗？4-20

☐ 23 当您用蜡笔（或铅笔、钢笔）在纸上来回乱画之后，宝宝能模仿您也用笔乱画吗？如果不需要您示范，他/她已经能自己在纸上乱画，也请打 2 分。6-12

18-24 个月起测点

☐ 24 宝宝能把几个玩具一个接一个地放进一个碗或盒子等容器里吗？您可以示范。5-14

☐ 25 宝宝能将面包屑、小麦圈或枸杞子等豌豆大小的东西装进小而透明的瓶子（如汽水瓶或婴儿奶瓶等）里吗？4-14

☐ 26 给孩子一支笔，您不做示范，他/她自己主动用笔来回乱画吗？5-16

☐ 27 先把一个面包屑或枸杞子等豌豆大小的东西装进一个透明小瓶子（如汽水瓶、婴儿奶瓶等）里，孩子能自己将瓶子翻转过来把东西倒出来吗？如果他/她自己不会将瓶子翻转过来把东西倒出来，您可以示范。6-16

24-30 个月起测点

☐ 28 先将一个面包屑或枸杞子等豌豆大小的东西装进一个透明小瓶子（如汽水瓶、婴儿奶瓶等）里，您不做示范，孩子能将瓶子翻转过来把东西倒出来吗？6-18

☐ 29 如果您做下列动作，孩子能模仿其中至少一个动作吗？ 3-20

1. 张开、闭上嘴巴
2. 眨眼睛
3. 拉拉耳垂
4. 拍拍脸

☐ 30 孩子能将物品放到应该放的地方吗？例如，知道玩具应放在玩具架子上，毯子应该放在床上，盘子应该放在厨房里。4-24

☐ 31 孩子能把一件物品假装是其它物品吗？例如，把杯子拿到耳边假装打电话；将盒子扣在头上假装是一顶帽子；用积木或小玩具来搅拌食物。3-22

☐ 32 您先示范把 4 个积木、小盒子或玩具汽车等物体排成一行，他/她能模仿将至少 2 个物体排成一行吗？5-20

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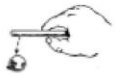
☐ 33 如果孩子想要一个他/她够不到的东西（如想拿柜台上的玩具或在厨房帮您的“忙”时），他/她会找一个椅子或其它支持物，站在上面去拿吗？6-20

30-36 个月起测点

☐ 34 在您示范后，宝宝能使用勺子或小棍子等类似的工具设法拿到手臂刚刚够不到的小玩具吗？6-14



☐ 35 在照镜子时，您问“某某(孩子的名字)在哪里？”，孩子会指着镜子里的自己吗？3-27

☐ 36 您先示范把 4 个积木、小盒子或玩具汽车等物体排成一行，他/她能模仿将 4 个玩具排成一行吗？6-24

☐ 37 按照右图所示，您示范用积木、盒子或罐头盒等搭“桥”，孩子能模仿您搭出这样的桥吗？5-36

☐ 38 对孩子说，“说 7、3”。孩子能按正确的顺序说这 2 个数字吗？如果孩子没有完成，不要重复。可换用另一对数字“说 8、2”。只要能正确地重复其中的一个数字串，请打 2 分。5-30

36-45 个月起测点

☐ 39 孩子能把自己假扮或假想成某人或某样东西吗？例如穿上不同的衣服等，装扮成妈妈、爸爸、兄弟或姐妹，或者是一个想象中的动物或人物等。6-42

☐ 40 指着本题旁边的图画问孩子“这是什么?”，他/她能说出人或其他类似答案吗？您可以用类似“他还像什么”等方式追问，请写出他/她的前三个答案。如果他/她的第一个答案是“雪人”、“人”、“女孩”、“太空人”、“猴子”等都请打 2 分；如果他/她的第二个或/和第三个答案是人或其他类似答案请打 1 分。6-27

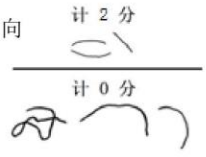
请写出他/她的答案：_____

☐ 41 在没有手势提示的情况下，孩子能完成“在…的下面”、“在…之间”和“在…中间”这三个方位的指令吗？例如您可以让他/她把鞋放在沙发下面、把球放在凳子之间、把书放在桌子中间。3-48

☐ 42 对孩子说，“说 5、8、3”。孩子能按正确的顺序说这 3 个数字吗？如果孩子没能完成，不要重复。可换用另一串数字“说 6、9、2”。只要能正确地重复其中一个数字串，请打 2 分。6-36

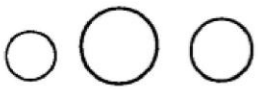
☐ 43 孩子画“画”(可能是简单地乱画)后，您问他/她“告诉我你画的是什么？”或“这是什么？”，他/她能告诉您他/她画的是什么吗？6-30

☐ 44 您先示范用笔在纸上从上到下画一条线，孩子能模仿在纸上画一条任意方向的直线吗？如果只是来回乱画，请打 0 分。5-18



45-54 个月起测点

☐ 45 您问“这三个圆圈哪个最小？”，孩子能指出最小的圆圈吗？在提问时请不要用手势、眼神或其他肢体语言提示。5-42



ASQ-I 跨龄版

解决问题

打分规则
2 分 = 总是做到
1 分 = 有时/部分做到
0 分 = 从不或偶然做到

提示：连续四题打“0”分即可终结本能区评估。

☐ 46 拿红、蓝、黄、橙、黑、白或粉红等不同颜色的东西问孩子“这是什么颜色的？”，他/她能正确说出至少 5 种不同的颜色吗？4-48

☐ 47 放置 5 个东西在孩子面前，他/她能按 1、2、3、4、5 的顺序点数吗？提问时，请不要用手势、其他肢体语言或说出物体名称等方式提供帮助。6-48

☐ 48 孩子能说出常见物品的六种不同形状吗？例如，孩子指着一个方盒子说：“这是正方形的。”如果孩子能说出至少三种形状，请打 1 分。常见物品的形状包括（供参考）：29p
1. 圆形　2. 长方形　3. 三角形　4. 正方形　5. 星形　6. 菱形

☐ 49 问孩子，房子、汽车和杯子，哪个最大，哪个最小。孩子能告诉你哪个最大、哪个最小吗？21p

☐ 50 让孩子看 26 个汉语拼音字母（或英文字母），孩子能正确念出 10 个以上的字母吗（可以是按汉语拼音念或按英文字母念）？如果孩子能念出 7 个字母，请打 1 分。27p

☐ 51 孩子能用斜体字的反义词完成下面的句子吗？请将孩子的回答写在相应句子后面的横线上。例如，岩石是硬的，枕头是软的。请填写孩子的回答：
牛是*大的*，老鼠是_____；
冰是*凉的*，火是_____；
我们在*夜晚*可以看到星星，在_____可以看到太阳；
当我向*上*抛球，球会_____。
如果 4 题中答对 3 题，请打 2 分。如果答对 2 题，请打 1 分。4-60

☐ 52 孩子认识数字吗？如果下面 3 个他/她都认识，请打 2 分。如果只认识其中 2 个，请打 1 分。6-54

3　　1　　2

☐ 53 孩子认识自己的姓名（即全名或学名）吗？若把顺序颠倒，他/她还能认识每一个字吗？6-60

☐ 54 孩子认识从 1 到 10 这 10 个阿拉伯数字吗？例如，你指着书/卡片/门牌号码上的一个数字问孩子，他/她能正确说出该数字吗？如果孩子能正确说出 5 个数字，请打 1 分。31p

☐ 55 孩子能数到 15 吗？能正确数到 15，请打 2 分；能正确数到 12，请打 1 分。5-54

☐ 56 问孩子哪只是他/她的左手或左脚，他/她能正确回答吗？22p

☐ 57 孩子能找出每组三个字中声调不同的字吗？组别一：问孩子“喝”、“球”和“山”这三个字里，音调与其他两个字不同的是哪个字，孩子能告诉你是“球”吗？组别二：问孩子“马”、“鸟”和“唱”这三个字里声调与其他两个字不同的是哪个字，孩子能告诉你是“唱”吗？如果孩子只能正确回答其中一组，请打 1 分。 28p

☐ 58 孩子能从 1 数到 20 吗？9p

☐ 59 在孩子面前摆出三枚硬币：一角、五角和一元，孩子能指出哪个是一角硬币吗？13p

☐ 60 孩子能按顺序说出一个星期的七天都是星期几吗？14p

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☐ 61 问孩子星期六的前一天和后一天是星期几，他/她能正确回答吗？如果能回答其中一天，请打 1 分。15p

☐ 62 问孩子 6 减 1 是多少，然后继续问 4 减 2、8 减 3，他/她能正确地从一个数里面减去另一个数吗？孩子可以用手指辅助计算。如果只能算出三题中的一题，请打 1 分。 16p

☐ 63 孩子能分辨两个字的开始音（声母）是否相同，也能分辨两个字的结束音（韵母）是否相同吗？30p
开始音（声母）**相同**的例子是：“妈”和“梦”、“平”和“爬”；
开始音（声母）**不同**的例子是：“菜”和“车”、“卷”和“圈”；
结束音（韵母）**相同**的例子是：“你”和“鸡”、“痛”和“重”。
结束音（韵母）**不同**的例子是：“鸡”和“家”、“桃”和“糖”等等。

☐ 64 孩子能从 1 数到 40 吗？10p

☐ 65 孩子能正确发出汉语拼音中的四个声调（-为阴平，/为阳平，√为上声，\为去声）吗？18p

☐ 66 孩子能告诉你一年中的 12 个月份吗？如果孩子能说出至少 6 个月份，请打 1 分。19p

☐ 67 问孩子 4 加 2 是多少，然后继续问 3 加 5、7 加 1，他/她能正确地把每题中的两个数字相加吗？孩子可以用手指辅助计算。如果只能算出三题中的一题，请打 1 分。 17p

☐ 68 孩子能以十为单位数到一百吗？（即 10、20、30……100）？11p

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沟通能区

提示：连续四题打“0”分即可终结本能区评估。

打分　*1-3 个月起测点*

☐ 1　宝宝有时候会发出喉音或咯咯声吗？1-2

☐ 2　当您离开宝宝的视线，然后又出现在他/她面前时，他/她会笑起来或显得高兴吗？6-2

☐ 3　宝宝会发出“哦”、“咯” 和“啊”等咕咕声吗？2-2

3-6 个月起测点

☐ 4　宝宝会发出尖细的叫声吗？4-4

☐ 5　当您对宝宝“说话”时，他/她会对您微笑吗？4-2

☐ 6　当您对宝宝“说话”时，他/她能发出声音回应您吗？3-2

☐ 7　宝宝能大声笑吗？5-4

☐ 8　看着玩具或人时，宝宝能发出声音“说话”吗？6-4

6-9 个月起测点

☐ 9　如果您在宝宝的视线之外叫他/她，他/她能朝您的方向看吗？3-6

☐ 10　当有大的声音出现时，宝宝能转头看声音的来源吗？4-6

☐ 11　宝宝会轻声咯咯笑吗？5-2

☐ 12　宝宝能发咕哝声、低吼声或其它低调的声音吗？2-6

9-12 个月起测点

☐ 13　宝宝懂“不”的意思吗？例如，当您对宝宝说“不能…”等禁止性语言时，他/她对您说的话有反应、至少能短暂地停止正在进行的活动吗？5-8

☐ 14　宝宝会发类似“大”，“嘎”，“咔”和“爸”的声音吗？5-6

☐ 15　如果您模仿宝宝发的声音，他/她能对您重复这些声音吗？6-6

☐ 16　宝宝能连续发“爸-爸”、“大-大”或“嘎-嘎”等两个相似的音吗？这些音可能并没有任何特定的意思。6-8

☐ 17　当宝宝啼哭时听见除您之外其他人的声音时，他/她会停止啼哭吗？3-4

12-18 个月起测点

☐ 18　如果您不示范，只是口头要求宝宝做“再见”、“躲猫猫”、“欢迎”、“恭喜”等熟悉的动作或游戏时，他/她至少会一个吗？4-10

☐ 19　宝宝会用手指、拍或想拿起书中的图画吗？4-14

☐ 20　当您问“球(也可以是帽子或鞋等)在哪儿？”时，他/她会朝向该物品看吗？请确保您所问的相应物品在场。只要宝宝认识一种物品，就请打 2 分。5-12

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18-24 个月起测点

☐ 21 您不做手势，只是口头要求宝宝“过来”、“把东西给我”或“把东西放回去”等简单的指令时，他/她至少能完成一个吗？5-10

☐ 22 宝宝能说三个词吗？比如叫“妈妈”、“爸爸”、“达达”。“词”指的是他/她一直用于表示某个人或某个事物的语言。6-10

☐ 23 当宝宝想要某一件东西时，他/她会用手指那个东西告诉您吗？6-12

☐ 24 宝宝会用摇头表示“不”或用点头表示“是”吗？3-14

24-30 个月起测点

☐ 25 除了“妈妈”、“爸爸”外，宝宝还会说 4 个或更多个词吗？5-14

☐ 26 不用手势或其它肢体语言帮助、只是口头要求，孩子能至少完成下列指令中的三个吗？5-20

1. 把玩具放在桌子上
2. 把门关上
3. 把毛巾拿给我
4. 去找到你的外套
5. 拉着我的手
6. 拿着你的书

☐ 27 宝宝能按您的吩咐到另一个房间找到一件他/她所熟悉的玩具或物品吗？您可以问他/她“你的球在哪儿？”、“把你的外套给我拿来！”或“去拿你的毯子！”6-14

☐ 28 当您让孩子指他/她自己、您或玩具娃娃的鼻子、眼睛、头发、脚、耳朵等身体部位时，他/她能正确地指出至少 7 个吗？如果孩子能够指出至少 3 个部位，请打 1 分。3-22

30-36 个月起测点

☐ 29 看图片卡时，您问孩子“指给我哪个是猫？”或“狗在哪里？”等他/她熟悉的事或物，他/她能正确地指出至少一张吗？5-18

☐ 30 除了“妈妈”、“爸爸”以外，孩子还会说 8 个或更多个词吗？6-16

☐ 31 如果您指着一张球（猫咪、杯子或帽子等）的图片问孩子“这是什么？”，他/她能正确地说出至少一张图片的名称吗？4-20

☐ 32 在不用手势和其它肢体语言帮助的情况下，让孩子“把这本书放在桌子**上**”和“把这双鞋放在椅子**下面**”，他/她能正确地完成这两个方位的指令吗？ 6-27

☐ 33 除了“妈妈”、“爸爸”以外，孩子还会说 15 个或更多词吗？4-22

36 个月以上起测点

☐ 34 您上下移动上衣的拉链让孩子看，并说：“看，这个东西可以上下移动”。接着，您把拉链头拉到中间位置，要求他/她向下拉拉链。然后，您再把拉链头拉回到中间位置，要求他/她向上拉拉链。如此反复多次，每次都先把拉链头拉到中间位置，然后要求他/她向上或向下拉拉链。孩子是否总是都能做到您说“向上拉”时，就拉上拉链；您说“向下拉”时，就拉开拉链？ 5-33

☐ 35 孩子能模仿两个词的句子吗？例如，当您说“妈妈吃”、 “爸爸玩”或“走，回家”等两个词的句子时，孩子能模仿两个词的句子（可能他/她说的话难以听懂）回应您吗？5-16

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☐ 36 孩子能将 2 个或 3 个代表不同意思的词一起说出来（如“看狗狗”、“妈妈回家”或“猫走了”等）吗？表示相同意思的字组合不算，如“再见”，“没有了”，“好吧”。6-18
如果孩子能，请举例他/她说的词组合：

_____

☐ 37 看图画书时，孩子能告诉您图画中正在发生的事情或正在进行的动作吗？ 例如：（狗）在叫，（小男孩）在吃、跑、哭等。您可以问他/她：“狗（或小男孩）在干什么？”6-30

☐ 38 当您问“你叫什么名字？”时，孩子能正确的说出他/她的名字或小名吗？6-33

☐ 39 孩子能正确地使用至少 2 个人称代词（如“我”、“我的”、“你”、“你的”等）吗？5-22

45-54 个月起测点

☐ 40 孩子能说由 3-4 个词构成的句子吗？5-27
如果能，请举例：

_____

☐ 41 您不用手势帮助或断句重复，一次说三个互不相干的指令，孩子能完成吗？请注意：要在孩子开始做之前，将三个指令一次下达完毕。例如，“拍拍你的手，走到门口，坐下”或“把钢笔给我，翻开书，站起来”。5-42

☐ 42 孩子能否回答下列两个问题吗？如果他/她只能回答一个问题，请打 1 分”。2-48
问题 1：“你饿了怎么办？“可接受的回答包括拿食物，吃，要一些东西吃和吃点心。
请写出孩子的回答：

_____

问题 2：“你累了怎么办？”可接受的回答包括：打个盹，休息，睡觉，上床，躺下和坐下。
请写出孩子的回答：

_____

☐ 43 孩子能说 4-5 个词构成的句子吗？例如，“我要这辆汽车”。5-54

如果能，请举例：_____

☐ 44 孩子能说出同一类物品中的至少三样吗？例如，如果您问“告诉我一些能吃的东西？”，他/她能说出饼干、蛋、粮食等；或您说“告诉我一些动物的名子”，他/她能说出牛、狗或大象等动物。1-48

☐ 45 孩子能用量词、表示过去或现在意思的词造句吗？例如，“我看到两只猫”、“我正在玩”或“我昨天踢了球”等。4-48

☐ 46 当孩子听到了新鲜的词语，会尝试在对话中使用吗？6p

☐ 47 孩子会在问句结尾使用“吗”或“啊”表示提问吗？19p

☐ 48 孩子能使用形容词描述事物吗？例如，“把那个大球扔过来”或者“我要红色的碗”。14p

☐ 49 孩子能用表示过去意思的词语说话吗？例如，“我吃过饭了”或“我去了姥姥家”。21p

☐ 50 孩子在电话里说话时，电话那头的人能听懂他/她说什么吗？4p

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☐ 51 孩子能说表示将来意思的词汇的句子吗？例如，“我们明天去公园”或“我一会就要去踢球”等。如果能，请举例：6-54

_____

☐ 52 孩子能说出常见物品的至少两个特点吗？例如，如果您对他/她说“告诉我你的球有什么特点？”，他/她说出类似“它是圆的”、“我投球”或“它是大的”等答案。3-48

☐ 53 孩子能使用五个词语描述事物的位置吗？例如 “下面”、“上面”、“周围”、“之间”、“附近”、“中间”等等。8p

☐ 54 孩子能使用五个词语描述各种质感吗？例如，这个东西很“软”、“硬”、“粗糙”、“光滑”、“闪亮”等。2p

☐ 55 孩子能正确使用“这个”、“那个”、“这些”、“那些”四个词说完整的句子吗？例如，“这个是我的糖”或“那些是图画书”等。如果孩子能够正确使用其中至少三个词说完整的句子，请打 2 分；如果孩子能够正确使用其中至少一个词说完整的句子，请打 1 分”。6-42

☐ 56 孩子能比较事物之间的差异吗？例如，”我的冰激淋最大”、“我的车最棒”、“她最强壮”。15p

☐ 57 孩子能正确使用“一个”、“×（数字）个”“好多（或许多/很多等）”这些词语吗？例如，问：“天上有几个太阳？”，孩子能正确回答：“一个。”问：“桌子上有几个苹果？”孩子能正确回答“三个”或者“好多”。20p

☐ 58 孩子说话时会使用连接词吗？例如“和”、“但是”、“因为”、“如果”、“或者”等等。例如，孩子说：“我们可以玩，或者睡觉。”17p

☐ 59 孩子遇到听不懂的词语，会请你解释吗？5p

☐ 60 孩子能复述以下句子不犯错误吗? 每个句子您都可以再念一次。如果他/她两个句子都能不犯错误地复述， 请打 2 分。如果只能不犯错误地复述一个句子，请打 1 分。6-60

“小红藏起她的鞋子让小丽找” “小明读了他床底下的那本蓝色的书”

☐ 61 当您问“你的姓名（即全名或学名）叫什么？”时，孩子能正确的说出他/她的姓名（包括姓和名）吗？6-36

☐ 62 叫孩子给您讲故事，孩子能完整说出一个熟悉的故事里的主要情节吗？10p

☐ 63 孩子能正确描述家里常做的事情的步骤吗？例如，问孩子洗手怎么洗，孩子会说：“把手弄湿，用肥皂/洗手液搓手，冲水，关上水龙头，把手擦干。”1p

☐ 64 您给孩子讲一个新的故事之后，孩子能回忆说出故事的开头-发展-结局这些主要情节吗？您可以提问引导：“故事是怎样开始的？”7p

☐ 65 孩子会说至少一种表示比较意思的词（如，较重/更重/重一些、较健壮/更健壮/健壮一些、较短/更短/短一些）构成的句子吗？4-60
例如，问孩子：“轿车大，而公共汽车_____”（更大/较大/大一些）；
“猫重，而人_____（更重/较重/重一些）”；
“电视小，而书_____（更小/较小/小一些）”。

如果能，请举例：_____。

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个人-社会能区

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打分

1-3 个月起测点

☐ 1　当宝宝饿了、尿布湿了、累了或想让您抱的时候，他/她会哭吗？ 2-2

☐ 2　在没有喂奶时，宝宝有时候也会吸吮嘴巴吗？ 1-2

☐ 3　宝宝会对您微笑吗？ 3-2

☐ 4　当您对宝宝微笑时，他/她会用微笑来回应您吗？ 4-2

3-6 个月起测点

☐ 5　当宝宝看见乳房或奶瓶时，他/她知道就要给他/她喂奶了吗？ 6-2

☐ 6　当宝宝看见您在他/她的附近时，他/她会在您对他/她微笑或说话之前先对您微笑吗？ 5-4

☐ 7　宝宝会看自己的手吗？ 5-2

6-9 个月起测点

☐ 8　当您将宝宝的双手放在一起时，他/她会玩自己的手指吗？ 2-4

☐ 9　当照镜子时，宝宝会对镜子里的自己微笑或“说话”吗？ 6-4

☐ 10　当宝宝面朝上躺着时，他/她会抓着自己的脚玩吗？ 3-6

9-12 个月起测点

☐ 11　宝宝会设法拿到他/她的手够不到的玩具吗？他/她可能会用翻滚、以腹部为支点转动或爬行去拿到玩具。 6-6

☐ 12　用奶瓶给宝宝喂奶时，他/她会立刻用双手扶着奶瓶吗？若是母乳喂养，他/她会用游离的手摸着乳房吗？ 4-4

☐ 13　当照镜子时，宝宝会伸手去拍打镜子吗？ 4-6

☐ 14　宝宝会自己拿着饼干或小甜饼吃吗？ 6-8

12-18 个月起测点

☐ 15　宝宝会从您拿着的杯子里喝水、果汁或牛奶吗？ 5-8

☐ 16　宝宝对陌生人和对您及其他所熟悉的人表现出的行为是否不同？对陌生人的表现可能是凝视、皱眉、躲避或哭叫等。 2-6

☐ 17　当宝宝面朝上躺着时，他/她能把自己的脚放进嘴里吗？ 5-6

打分规则
2 分 = 总是做到
1 分 = 有时/部分做到
0 分 = 从不或偶然做到

提示：连续四题打“0”分即可终结本能区评估。

☐ 18 当您给宝宝穿衣服、他/她的手臂在袖筒口时，他/她会把手臂穿过袖子吗？ 5-10

☐ 19 当您伸出手向宝宝要他/她手里的玩具时，他/她会把玩具给您（但可能不松手放下玩具）吗？如果他/她已经能松开手把玩具放在您手里，也请打 2 分。 4-10

☐ 20 当您伸手向宝宝要他/她手里的玩具时，他/她能松开手将玩具放在您的手里吗？ 6-10

18-24 个月起测点

☐ 21 宝宝会把球滚回或扔回给您，以便您再把球滚或扔给他/她吗？ 5-12

☐ 22 宝宝会抱着洋娃娃或动物布偶玩吗？ 6-12

☐ 23 当您给宝宝穿衣服时，他/她会抬脚方便您给他/她穿鞋、穿袜子或者穿裤腿管吗？ 4-12

☐ 24 孩子会模仿您做事情（如将打翻的东西擦干净、扫地、刮胡子或梳头等）吗？ 6-18

☐ 25 孩子能推着小推车、婴儿车或其它操纵灵活的多轮玩具绕过障碍物，并在无法转弯时倒退出来吗？ 6-22

☐ 26 即使有可能把食物撒出来，宝宝会用勺子自己吃饭吗？ 4-14

24-30 个月起测点

☐ 27 当宝宝为了吸引您的注意力或想让您看什么东西的时候，他/她会拉您的手或扯您的衣服向您示意吗？ 6-14

☐ 28 当孩子给玩具上发条、打开瓶盖等需要帮助时，他/她会找您帮助吗？ 6-16

☐ 29 孩子会用勺子吃饭并很少洒出来吗？ 2-30

☐ 30 孩子喝水和将杯子放下时，能很少把水溅出来吗？ 5-18

30-36 个月起测点

☐ 31 如果您做下列动作，孩子能模仿其中至少一个动作吗？2-22
1. 张开、闭上嘴巴　　3. 拉拉耳垂
2. 眨眼睛　　4. 拍拍脸

☐ 32 宝宝会帮忙脱自己的袜子、帽子、鞋或手套等衣物吗？ 5-14

☐ 33 孩子会用叉子或筷子吃饭吗？ 6-20

☐ 34 在轮到别的孩子或大人做某事时，孩子能排队、等待轮到自己吗？ 6-36

☐ 35 当孩子玩洋娃娃或动物布偶时，他/她会摇晃着哄它、喂它吃饭、给它换尿布或把它放到床上等假扮游戏吗？ 5-20

36-45 个月起测点

☐ 36 当孩子照镜子时，您问“镜子里是谁？”，他/她会回答“是我”或“是某某（孩子自己的名字）”吗？ 6-30

ASQ-I 跨龄版

个人社会

打分规则
2 分 = 总是做到
1 分 = 有时/部分做到
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提示：连续四题打“0”分即可终结本能区评估。

☐ 37 当孩子照镜子时，他/她会把玩具递给镜子里的自己吗？ 4-16

☐ 38 当您把一条宽松的裤子套到孩子的脚上时，他/她会自己把裤子完全提到腰部吗？ 5-30

☐ 39 在多数时候，孩子能使用“我”而不是用他 / 她自己的名字称呼自己吗？例如，说“我做××××”多于说“某某（孩子的名字）做×××”。 6-24

☐ 40 孩子会因为自己能做某事而自豪吗？例如，向你展示他/她画的画，说：“看，我画的！” 23sp

45 个月以上起测点

☐ 41 如果您一字不差地使用如下句子向孩子提问“你是男孩还是女孩？”，他/她能正确地回答吗？ 6-33

☐ 42 孩子会告诉你他/她喜欢什么、不喜欢什么吗？例如，跟你说“我喜欢巧克力蛋糕”或者“我不喜欢玩布娃娃”。 17sp

☐ 43 孩子能自己用肥皂和水洗手，然后用毛巾擦干而不需要别人的帮助吗？ 6-42

☐ 44 一般情况下，孩子能和其他小朋友轮流从事某个活动或分享某件东西吗？ 6-60

☐ 45 在没有帮助的情况下，孩子会自己穿或脱衣服（不包括扣按扣、纽纽扣和拉拉链）吗？ 6-48

☐ 46 除兄弟及姐妹外，孩子能说出至少两个伙伴的名字吗？问这个问题时，请您不要提示伙伴或朋友的名字。 4-48

☐ 47 包括自己走进厕所、坐在便器上、擦屁股，然后冲厕所在内，孩子会自己上厕所完成这些事情吗？即使他/她是在您提醒后才完成这些，也请打 2 分。 5-60

☐ 48 孩子会自己穿上外套、夹克或衬衣吗？ 6-27

☐ 49 孩子能自己洗手、擤鼻涕、刷牙和梳头发吗？ 2ap

☐ 50 当你和孩子一起过马路时，孩子知道要先往左右两边看吗？ 3ap

☐ 51 孩子能将水或饮料从一个容器倒进另一个容器吗？例如，将果汁从小水瓶倒进杯子里。 8ap

☐ 52 当你带孩子到公众场合去，他/她知道如何举止吗？例如，当你们在图书馆、餐厅或是菜市场时。 11ap

☐ 53 吃饭时，孩子能自己动手、用筷子或勺子等合适的餐具，从盘子、汤碗或饭锅等餐具里取食物到自己的碗里吗？例如，孩子会用筷子或勺子从盘子里夹菜到自己的碗里吗？ 5-42

☐ 54 孩子会远离危险的东西吗？例如，滚烫的炉子、行驶中的汽车。 10ap

☐ 55 在下列问题中，孩子能至少回答其中四个吗？请在孩子回答正确的项目上画圈。 2-48

1. 名字
2. 年龄
3. 所居住的城市
4. 姓
5. 男孩或女孩
6. 电话号码

☐ 56 孩子会自己发起游戏活动，并邀请小朋友加入吗？例如，孩子说：“来吧，我们一起搭房子，你来搭厨房。” 9sp

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1 分 = 有时/部分做到
0 分 = 从不或偶然做到

提示：连续四题打“0”分即可终结本能区评估。

☐ 57 在没有帮助的情况下，孩子会将牙膏挤到牙刷上，然后自己刷牙吗？您可能还是需要检查并重新为他/她刷牙。 5-48

☐ 58 孩子能自己洗澡（在您的监督下）吗？她能自己脱掉衣物、进入浴缸或淋浴间、清洗身体并自己擦干吗？ 9ap

☐ 59 当孩子玩桌面上的游戏，例如棋类或纸牌时，他/她能跟别人轮流来吗？ 22sp

☐ 60 孩子能在大人的组织下，与其他小朋友一起参与至少 10-15 分钟的群体活动吗？例如，五名以上的小朋友围成圆圈坐在一起听老师讲故事或玩游戏。 15sp

☐ 61 如果孩子与别的小朋友相处时出了问题，他/她会告诉大人吗？ 11sp

☐ 62 包括系中等大小的纽扣和拉前面的拉链在内，孩子会自己穿或脱衣服吗？ 6-54

☐ 63 当孩子与小朋友之间产生冲突时，会尝试解决吗？例如，孩子可能会提议：“我知道你也想玩积木。我们轮流搭，好吗？” 8sp

☐ 64 孩子会以取回玩具或者是说“这是我的”的方式，宣告对自己的玩具的所有权吗？ 10sp

☐ 65 在使用别人的东西之前，孩子知道要先问过别人吗？ 21sp

☐ 66 不需大人提醒，孩子能自己开始玩玩具，并且自己结束玩耍吗？例如，孩子自己取出拼图拼着玩，玩完了就自己把拼图收拾起来。 13sp

☐ 67 孩子知道发生紧急情况时该怎么做吗？例如，他/她能打电话找大人帮忙，或者打 110 求助吗？ 13ap

Child/Family Information form
ASQ Inventory for Infants & Toddlers Study

1. Date the ASQI was completed: _____

2. Child's Date of Birth: _____

3. Was your child 3 or more weeks premature at birth?

___No ___Yes ___ Don't know

4. Child's Gender:

___Male, ___ Female

5. Child's Race / Ethnicity: (please check all that apply)

___White ___ Black or African American ___ Asian ___Native American
___ Pacific Islander ___Hispanic or Latino ___ Don't know

6. Child's weight at birth less than 3lb/5oz:

___No ___Yes

7. Mother's level of education:

___Less than high school ___High School ___ AA Degree,
___4 yrs college or above ___ Don't know

8. Mother's age at birth of child:

(enter age) _____

9. Person answering questions:

__Mother __Father __Both parents __Grandparent(s) __ Guardian
__Foster parent __ Adoptive parent(s) __Teacher/ Home visitor
__Other (please describe):_____

10. a). Yearly Family Income:

__$ 0 – 12,000
__$ 12,000 - 24,000
__$ 24,000 - 40,000
__$ Over 40,000

10.b) Number of people in household:

_____

11. Does your child have a diagnosed disability or developmental delay? ___ No ___Yes
If yes, please explain: _____

_____

12. Does your child receive special services? (For example, does your child receive services for speech/language, behavior/mental health or other therapies? Does your child have an IFSP or education plan?)

__ No __ Yes

If yes, please describe services:_____

Ages and Stages Questionnaires®: Inventory

(For children ages 4 weeks up to 54 months)

Communication

Instructions for completion:

1. Use the following table to find your child's starting point based on his/her age.
2. Read each question carefully and check the box that tells whether your child is doing the activity **yes (regularly), sometimes, or not yet**.
3. Try each activity unless you are certain that your child can already do the item, or you know they cannot yet do the item.

Please note: there may be some activities that your child used to do, but has replaced with a more advanced skill (for example, older children may start talking instead of cooing). An-

Starting points for the Communication domain:

If your child's age is:	Start with item:	Page:
1 up to 3 months	1	2
3 up to 6 months	4	2
6 up to 9 months	9	2
9 up to 12 months	13	3
12 up to 18 months	18	3
18 up to 24 months	21	3
24 up to 30 months	25	4
30 up to 36 months	29	4
36 up to 45 months	34	5
45 up to 54 months	40	6

Tips for completing the ASQ™:Inventory

- Try to make completing this questionnaire a game that is fun for you and your child.
- Make sure your child is rested, fed, and ready to play.

Communication

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
1 up to 3 month babies start here:				
1. Does your baby sometimes make throaty or gurgling sounds? 1-2				
2. After you have been out of sight, does your baby smile or get excited when she sees you? 6-2				
3. Does your baby make cooing sounds such as "ooo," "gah," and "aah"? 2-2				
3 up to 6 month babies start here:				
4. Does your baby make high-pitched squeals? 4-4				
5. Does your baby smile when you talk to him? 4-2				
6. When you speak to your baby, does she make sounds back to you? 3-2				
7. Does your baby laugh? 5-4				
8. Does your baby make sounds when looking at toys or people? 6-4				
6 up to 9 month babies start here:				
9. If you call your baby when you are out of sight, does she look in the direction of your voice? 3-6				
10. When a loud noise occurs, does your baby turn to see where the sound came from? 4-6				
11. Does your baby chuckle softly? 5-2				
12. When playing with sounds, does your baby make grunting, growling, or other deep-toned sounds? 2-6				
Subtotal	___	___	___	___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Communication

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th

9 up to 12 month babies start here:

13. Does your baby respond to the tone of your voice and stop his activity at least briefly when you say "no-no" to him?
5-8

14. Does your baby make sounds like "da," "ga," "ka," and "ba"?
5-6

15. If you copy the sounds your baby makes, does your baby repeat the same sounds back to you?
6-6

16. Does your baby make two similar sounds like "ba-ba," "da-da," or "ga-ga"? (The sounds do not need to mean anything.)
6-8

17. Does your baby stop crying when she hears a voice other than yours?
3-4

12 up to 18 month children start here:

18. If you ask your child to, does he play at least one nursery game even if you don't show him the activity yourself (such as "bye-bye"," Peek-a-boo," "clap your hands," "So Big")?
4-10

19. Does your child point to, pat, or try to pick up pictures in a book?
4-14

20. When you ask, "Where is the ball (hat, shoe, etc.)?" does your child look at the object? (Make sure the object is present. Mark "yes" if he knows one object.)
5-12

18 up to 24 month children start here:

21. Does your child follow one simple command, such as "Come here", "Give it to me", or "Put it back", *without* your using gestures?
5-10

22. Does your child say three words, such as "Mama", "Dada" and "Baba"? (A "word" is a sound or sounds your child says consistently to mean someone or something.)
6-10

Subtotal ____ ____ ____ ____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Communication

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
23. When your child wants something, does he tell you by *pointing* to it? 6-12				
24. Does your child shake his head when he means "no" or "yes"? 3-14				

24 up to 30 month children start here:

25. Does your child say four or more words in addition to "Mama" and "Dada"? 5-14				
26. Without your giving him clues by pointing or using gestures, can your child carry out at least *three* of these kinds of directions? 5-20				

a. "Put the toy on the table."
b. "Close the door."
c. "Bring me a towel."
d. "Find your coat."
e. "Take my hand."
f. "Get your book."

27. When you ask him to, does your child go into another room to find a familiar toy or object? (You might ask, "Where is your ball?" or say, "Bring me your coat" or "Go get your blanket.") 6-14				
28. When you ask your child to point to her nose, eyes, hair, feet, ears, and so forth, does your child correctly point to at least *seven* body parts? (She can point to part/s of herself, you, or a doll. Mark "sometimes" if she correctly points to at least three different body parts.) 3-22				

30 up to 36 month children start here:

29. Without your showing him, does your child *point* to the correct picture when you say, "Show me the kitty" or ask, "Where is the dog?" (He needs to identify only one picture correctly.) 5-18				
30. Does your child say eight or more words in addition to "Mama" and "Dada"? 6-16				
31. If you point to a picture of a ball (kitty, cup, hat, etc.) and ask your child, "What is this?" does your child correctly *name* at least one picture? 4-20				
Subtotal	___	___	___	___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Communication

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
32. Without giving your child help by pointing or using gestures, ask him to "put the book *on* the table" and "put the shoe *under* the chair." Does your child carry out both of these directions correctly? 6-27				
33. Does your child say 15 or more words in addition to "Mama" and "Dada"? 4-22				

36 up to 45 month children start here:

34. Show your child how a zipper on a coat moves up and down, and say, "See, this goes up and down." Put the zipper to the middle, and ask your child to move the zipper *down.* Return the zipper to the middle, and ask your child to move the zipper *up.* Do this several times, placing the zipper in the middle before asking your child to move it up or down. Does your child consistently move the zipper up when you say "up" and down when you say "down"? 5-33				
35. Does your child imitate a two-word sentence? For example, when you say a two-word phrase, such as "Mama eat," "Daddy play," "Go home," or "What's this?" does your child say both words back to you? (Mark "yes" even if his words are difficult to understand.) 5-16				
36. Does your child say two or three words that represent different ideas together, such as "See dog," "Mommy come home," or "Kitty gone"? (Don't count word combinations that express one idea, such as "bye-bye," "all gone," "all right," and "What's that?") 6-18				

Please give an example of your child's word combinations:
_____
_____

37. When looking at a picture book, does your child tell you what is happening or what action is taking place in the picture (for example, "barking," "running," "eating," and "crying")? You may ask, "What is the dog (or boy) doing?" 6-30				
38. When you ask, "What is your name?" does your child say his first name or nickname? 6-33				
Subtotal	___	___	___	___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Communication

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
39. Does your child correctly use at least two words like "me," "I," "mine," and "you"? 5-22				

45 up to 54 month children start here:

	1st	2nd	3rd	4th
40. Does your child make sentences that are three or four words long? 5-27				

Please give an example:

_____

_____

	1st	2nd	3rd	4th
41. Without your giving help by pointing or repeating directions, does your child follow three directions that are *unrelated* to one another? Give all three directions before your child starts. For example, you may ask your child, "Clap your hands, walk to the door, and sit down," or "Give me the pen, open the book, and stand up." 5-42				

	1st	2nd	3rd	4th
42. Does your child answer the following questions? (Mark "sometimes" if your child answers only one question.)				

"What do you do when you are hungry?" (Acceptable answers include: "get food," "eat," "ask for something to eat," and "have a snack.")

Please write your child's response:

_____

_____

"What do you do when you are tired?" (Acceptable answers include "take a nap," "rest," "go to sleep," "go to bed," "lie down," and "sit down.")

Please write your child's response:

_____

_____

2-48

	1st	2nd	3rd	4th
43. Does your child use four- and five-word sentences? For example, does your child say, "I want the car"? 5-54				

Please write an example:

_____

_____

Subtotal ____ ____ ____ ____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Communication

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
44. Does your child name at least three items from a common category? For example, if you say to your child, "Tell me some things that you can eat," does your child answer with something like "cookies, eggs, and cereal"? Or if you say, "Tell me the names of some animals," does your child answer with something like, "cow, dog, and elephant"? 1-48				
45. Does your child use endings of words, such as "-s," "-ed," and "-ing"? For example, does your child say things like, "I see two cats," "I am play*ing*," or "I kick*ed* the ball"? 4-48				
46. After hearing new words, does your child try to use them in conversation? 6p				
47. Does your child make her voice go high at the end of a sentence that is a question? 19p				
48. Does your child use words to describe things? For example, your child says, "Throw the big ball," or "I want the red pepper." 14p				
49. Does your child talk about things that are going to occur in the future? For example, your child says, "We are going to the zoo tomorrow." 21p				
50. When your child talks on the phone, can other people understand what she says? 4p				
51. When talking about something that already happened, does your child use words that end in "-ed," such as "walk*ed*", "jump*ed*", or "play*ed*"? Ask your child questions, such as "How did you get to the store?" ("We walk*ed*.") "What did you do at your friend's house?" ("We play*ed*.") 6-54				

Please write an example:
_____
_____

Subtotal ____ ____ ____ ____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Communication

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
52. Does your child tell you at least two things about common objects? For example, if you say to your child, "Tell me about your ball," does she say something like, "It's round. I throw it. It's big?" 3-48				
53. Does your child use at least 5 words to describe position? For example, does she use words such as "above," "across," "around," "between," "below," "near," "over," and "through". 8p				
54. Does your child use 5 words to describe how things feel? For example, does she use words like soft, hard, bumpy, rough, smooth, shimmy, or scratchy? 2p				
55. Does your child use all of the words in a sentence (for example, "a," "the," "am," "is," and "are") to make complete sentences, such as "I *am* going to *the* park," or "*Is* there *a* toy to play with?" or "*Are* you coming, too?" 6-42				
56. Does your child use words to talk about how things are different from one another? For example, your child says, "I have the biggest bowl of ice cream," "My car is best," or "She is the strongest." 15p				
57. Does your child talk about things that happened in the past using at least 3 irregular verbs such as came, did, went, ran, sat, and fell? 20p				
58. Does your child use words that connect other words such as "and," "but," "because," "if," and "or"? For example, your child says, "We could play or take a nap." 17p				
59. Does your child ask you to explain words she does not understand? 5p				
Subtotal	___	___	___	___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Communication

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th

60. Does your child repeat the sentences shown below back to you, without any mistakes? (Read the sentences one at a time. You may repeat each sentence one time. Mark "yes" if your child repeats both sentences without mistakes or "sometimes" if your child repeats one sentence without mistakes.)
6-60

    Jane hides her shoes for Maria to find.
    Al read the blue book under his bed.

61. When you ask, "What is your name?" does your child say both her first and last names?
6-36

62. Here are examples of five things that have irregular plural endings: man→men, mouse→mice, child→children, goose→geese, and tooth→teeth. Does your child say at least 3 of these or other similar words correctly?
10p

63. Can your child tell you all the steps in a family routine? For example, if you ask her to tell you all the steps to wash her hands, your child says, "I turn on the water, get some soap, wash my hands, turn off the water and dry my hands."
1p

64. After reading a new story to your child, can your child tell you the beginning, middle, and ending of the story? (You can help the child by saying, "How does the story begin?")
7p

65. Does your child use comparison words, such as "heavier," "stronger", or "shorter"? Ask your child questions, such as "A car is big, but a bus is _____" (bigger); "A cat is heavy, but a man is _____" (heavier); "A TV is small, but a book is_____" (smaller)
4-60

    Please write an example :

    _____

    _____

Subtotal ____ ____ ____ ____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Ages & Stages Questionnaires®:Inventory

(For children ages 4 weeks up to 54 months)

Gross Motor

Instructions for completion:

1. Use the following table to find your child's starting point based on his/her age.
2. Read each question carefully and check the box that tells whether your child is doing the activity **yes (regularly), sometimes, or not yet**.
3. Try each activity unless you are certain that your child can already do the item, or you know they cannot yet do the item.

Please note: there may be some activities that your child used to do, but has replaced with a more advanced skill (for example, most children no longer crawl after they learn to walk).

Starting points for the Gross Motor domain:

If your child's age is:	Start with item:	Page:
1 up to 3 months	1	2
3 up to 6 months	5	2
6 up to 9 months	8	2
9 up to 12 months	13	3
12 up to 18 months	19	3
18 up to 24 months	24	4
24 up to 30 months	29	4
30 up to 36 months	34	5
36 up to 45 months	39	6
45 up to 54 months	45	6

Tips for completing the ASQ™:Inventory

- Try to make completing this questionnaire a game that is fun for you and your child.
- Make sure your child is rested, fed, and ready to play.

Gross Motor

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
1 up to 3 month babies start here:				
1. While your baby is on his back, does your child wave his arms and legs, wiggle and squirm? 1-2				
2. When your baby is on her back, does she kick her legs? 4-2				
3. After holding her head up while on her tummy, does your baby lay her head back down on the floor, rather than let it drop or fall forward? 6-2				
4. When your baby is on his tummy, does he hold his head up longer than a few seconds? 3-2				
3 up to 6 month babies start here:				
5. While your baby is on his back, does he move his head from side to side? 5-2				
6. When your baby is on her tummy, does she turn her head to the side? 2-2				
7. When you hold him in a sitting position, does your baby hold his head steady? 5-4				
6 up to 9 month babies start here:				
8. When your baby is on his tummy, does he hold his head up so that his chin is about 3 inches from the floor for at least 15 seconds? 3-4 				
9. While your baby is on her back, does she bring her hands together over her chest, touching her fingers? 6-4 				
10. While your baby is on his back, does your baby lift his legs high enough to see his feet? 1-6				
11. When she is on her tummy, does your baby hold her head straight up, looking around? (*She can rest on her arms while doing this.*) 4-4 				
Subtotal	___	___	___	___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Gross Motor

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
12. When you put your baby on the floor, does she lean on her hands while sitting? (If she already sits up straight without leaning on her hands, mark "yes" for this item.) 4-6 				

9 up to 12 month babies start here:

13. If you hold both hands just to balance your baby, does he support his own weight while standing? 5-6 				
14. When your baby is on her tummy, does she straighten both arms and push her whole chest off the bed or floor? 2-6				
15. Does your baby roll from his back to his tummy, getting both arms out from under him? 3-6				
16. When sitting on the floor, does your baby sit up straight for several minutes *without* using her hands for support? 5-8 				
17. Does your baby get into a crawling position by getting up on her hands and knees? 6-6 				
18. When you stand your baby next to furniture or the crib rail, does he hold on without leaning his chest against the furniture for support? 6-8 				

12 up to 18 month children start here:

19. If you hold both hands just to balance your child, does he take several steps without tripping or falling? (If your child already walks alone, mark "yes" for this item.) 4-12 				
20. While holding onto furniture, does your child lower himself with control (without falling or flopping down)? 5-10				
Subtotal	___	___	___	___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Gross Motor

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
21. While holding onto furniture, does your child bend down and pick up a toy from the floor and then return to a standing position? 4-10 				
22. Does your child walk beside furniture while holding on with only one hand? 6-10				
23. When you hold one hand just to balance your child, does she take several steps forward? (If your child already walks alone, mark "yes" for this item.) 5-12 				

18 up to 24 month children start here:

24. Does your child bend over or squat to pick up an object from the floor and then stand up again without any support? 5-14				
25. Does your child climb onto furniture or other large objects such as large climbing blocks? 4-14				
26. Does your child stand up in the middle of the floor by himself and take several steps forward? 6-12				
27. Does your child move around by walking, rather than by crawling on his hands and knees? 6-14				
28. Does your child walk well and seldom fall? 5-16				

24 up to 30 month children start here:

29. Does your child climb on an object such as a chair to reach something she wants? (For example, to get a toy on a counter or to "help" you in the kitchen.) 6-16				
30. When you show your child how to kick a large ball, does he try to kick the ball by moving his leg forward or by walking into it? (If your child already kicks a ball, mark "yes" for this item.) 6-18 				
Subtotal	____	____	____	____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Gross Motor

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
31. Does your child walk either up or down at least two steps by himself? He may also hold onto the railing or wall. 6-20 				
32. Does your child walk down stairs if you hold onto one of her hands? She may also hold onto the railing or wall. (You can look for this at a store, on a playground, or at home.) 5-18				
33. Does your child run fairly well, stopping herself without bumping into things or falling? 5-20 				
30 up to 36 month children start here:				
34. Without holding onto anything for support, does your child kick a ball by swinging his leg forward? 6-22 				
35. Does your child climb the rungs of a ladder of a playground slide and slide down without help? 6-42				
36. Does your child jump with both feet leaving the floor at the same time? 5-22 				
37. While standing, does your child throw a ball *overhand* by raising his arm to shoulder height and throwing the ball forward? (Dropping the ball or throwing the ball underhand should be scored as "not yet" .) 6-33 				
38. Does your child walk up stairs, using only one foot on each stair? (The left foot is on one step, and the right foot is on the next.) He may hold onto the railing or wall. 6-27 				
Subtotal	___	___	___	___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Gross Motor

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th

36 up to 45 month children start here:

39. Does your child jump forward at least 3 inches with both feet leaving the ground at the same time?
5-27

40. Does your child stand on one foot for about 1 second without holding onto anything?
6-30

41. While standing, does your child throw a ball *overhand* in the direction of a person standing at least 6 feet away? To throw overhand, your child must raise her arm to shoulder height and throw the ball forward. (Dropping the ball or throwing the ball underhand should be scored as "not yet.")
3-48

42. Does your child walk on his tiptoes for 15 feet (about the length of a large car)? (You may show him how to do this.)
6-54

43. Does your child catch a large ball with both hands? (You should stand about 5 feet away and give your child two or three tries before you mark the answer.)
5-42

44. Does your child jump forward at least 6 inches with both feet leaving the ground at the same time?
6-36

45 up to 54 month children start here:

45. Does your child walk forward on a straight line for 10 or more steps?
10p

Subtotal ___ ___ ___ ___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Gross Motor

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

		1st	2nd	3rd	4th
46.	Does your child walk down the stairs with alternating feet? 17p				
47.	Without holding onto anything, does your child stand on one foot for at least 5 seconds without losing his balance and putting his foot down? (You may give your child two or three tries before you mark the answer.) 6-48				
48.	Does your child hop up and down on either the right or left foot at least one time without losing his balance or falling? 4-48				
49.	Does your child kick a ball while running and changing directions? For example, while playing soccer? 3p				
50.	Show your child how to walk forward by placing the heel of one foot right in front of the toe of her other foot. Can your child walk 10 or more steps forward? 12p				
51.	Does your child hop on one foot for a distance of 2 feet? 7p 				
52.	Does your child jump and turn so that she faces the other way? 8p				
53.	Does your child hop in place on one foot for 3 times? 6p 				
54.	Does your child jump forward a distance of 20 inches from a standing position, starting with her feet together? 5-48 				
55.	Can your child catch a small ball (such as a tennis ball) that is thrown from 5-6 feet away? 19p				

Subtotal ____ ____ ____ ____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Gross Motor

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
56. Ask your child to repeat a movement pattern, such as run, jump, and skip. Does your child do all three movements at least 2 times? 9p				
57. Does your child jump forward a distance of 3 feet from a standing position? She should start with her feet together. 4p 				
58. Show your child how to walk backward by placing the toe of one foot in back of and touching the heel of the other. Can your child walk 10 or more steps backward? 13p				
59. Does your child skip using alternating feet? (You may show her how to do this.) 6-60				
60. Does your child jump on one foot 10 times, first using her right foot (5 times) and then her left foot (5 times)? 5p 				
61. Can your child throw a small ball and hit a target that is 5-6 feet away? 20p				
62. Does your child hop forward on one foot for a distance of 4-6 feet without putting down the other foot? (You may give him two tries on each foot. Mark "sometimes" if he can hop on one foot only.) 5-60 				
63. Can your child swing on a swing by herself using her legs back and forth to pump. 14p				
64. Can your child ride and steer a two-wheel bicycle without training wheels for at least 20 feet? 18p				
65. Can your child skip rope? He should jump at least three times while flipping the rope over his head and under his feet. 16p				
Subtotal	____	____	____	____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Ages & Stages Questionnaires®:Inventory

(For children ages 4 weeks up to 54 months)

Fine Motor

Instructions for completion:

1. Use the following table to find your child's starting point based on his/her age.
2. Read each question carefully and check the box that tells whether your child is doing the activity **yes (regularly), sometimes, or not yet**.
3. Try each activity unless you are certain that your child can already do the item, or you know they cannot yet do the item.

Please note: there may be some activities that your child used to do, but has replaced with a more advanced skill (for example, older children no longer have their hands tightly closed when they are awake). Answer these items as "Yes".

Starting points for the Fine Motor domain:		
If your child's age is:	Start with item:	Page:
1 up to 3 months	1	2
3 up to 6 months	5	2
6 up to 9 months	10	2
9 up to 12 months	14	3
12 up to 18 months	19	3
18 up to 24 months	23	4
24 up to 30 months	26	4
30 up to 39 months	30	5
39 up to 54 months	34	5

Tips for completing the ASQ™:Inventory

- Try to make completing this questionnaire a game that is fun for you and your child.
- Make sure your child is rested, fed, and ready to play.

Fine Motor

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

1 up to 3 month babies start here:

	1st	2nd	3rd	4th
1. Does your baby touch her face with her hands? 4-2				
2. Does your baby grasp your finger if you touch the palm of her hand? 2-2 				
3. Does your baby hold his hands open or partly open when he is awake (rather than in fists, as they were when he was a newborn)? 5-2 				
4. Is your baby's hand usually tightly closed when he is awake? (If your baby used to do this but is no longer, mark "yes".) 1-2				

3 up to 6 month babies start here:

5. Does your baby grab or scratch at his clothes? 6-2				
6. When you put a toy in her hand, does your baby hold it in her hand briefly? 3-2 				
7. Does your baby grab or scratch his fingers on a surface in front of him, either while being held in a sitting position or when he is on his tummy? 5-4				
8. When you put a toy in her hand, does your baby hold onto it for about 1 minute while looking at it, waving it about, or trying to chew it? 4-4				
9. Does your baby grab a toy you offer and look at it, wave it about, or chew on it for about 1 minute? 1-6				

6 up to 9 month babies start here:

10. When you hold your baby in a sitting position, does she reach for a toy on a table close by, even though her hand may not touch it? 6-4				

Subtotal ___ ___ ___ ___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Fine Motor

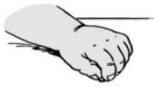
Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
11. Does your baby pick up a small toy with only one hand? 6-6 				
12. Does your baby reach for or grasp a toy using both hands at once? 2-6				
13. Does your baby pick up a small toy, holding it in the center of her hand with her fingers around it? 4-6 				

9 up to 12 month babies start here:

14. Does your baby reach for a crumb or Cheerio and touch it with his finger or hand? (If he already picks up a small object the size of a pea, mark "yes" for this item.) 3-6 				
15. Does your baby try to pick up a crumb or Cheerio by using his thumb and all his fingers in a raking motion, even if he isn't able to pick it up? (If he already picks up the crumb or Cheerio, mark "yes" for this item.) 5-6 				
16. Does your baby successfully pick up a crumb or Cheerio by using his thumb and all his fingers in a raking motion? (If he already picks up a crumb or Cheerio, mark "yes" for this item.) 5-8 				
17. Does your child pick up a small toy with the tips of her thumb and fingers? (You should see a space between the toy and her palm.) 6-8 				
18. After one or two tries, does your baby pick up a piece of string with her first finger and thumb? (The string may be attached to a toy.) 4-10 				

12 up to 18 month children start here:

19. Does your child pick up a crumb or Cheerio with the *tips* of his thumb and a finger? He may rest his arm or hand on the table while doing it. 5-10 				

Subtotal ____ ____ ____ ____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Fine Motor

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
20. Does your child put a small toy down, without dropping it, and then take her hand off the toy? 6-10				
21. Without resting his arm or hand on the table, does your child pick up a crumb or Cheerio with the tip of his thumb and a finger? 4-12 				
22. Does your child help turn the pages of a book? (You may lift a page for her to grasp.) 6-12				
18 up to 24 month children start here:				
23. Does your child turn the pages of a book by himself? (He may turn more than one page at a time.) 6-16				
24. Does your child make a mark on the paper with the *tip* of a crayon (or pencil or pen) when trying to draw? 5-14 				
25. Does your child stack a small block or toy on top of another one? (You could also use spools of thread, small boxes, or toys that are about 1 inch in size.) 4-14				
24 up to 30 month children start here:				
26. Does your child flip switches off and on? 5-22				
27. Does your child throw a small ball with a forward arm motion? (If he simply drops the ball, mark "not yet" for this item.) 5-12 				
28. Does your child stack three small blocks or toys on top of each other by herself? (You could also use spools of thread, small boxes, or toys that are about 1 inch in size.) 6-14				
29. Does your child get a spoon into her mouth right side up so that the food usually doesn't spill? 6-18				
Subtotal	____	____	____	____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Fine Motor

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

30 up to 39 month children start here:

	1st	2nd	3rd	4th

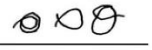
30. Does your child stack six small blocks or toys on top of each other by himself? (You could also use spools of thread, small boxes, or toys that are about 1 inch in size.)
5-20

31. Does your child use a turning motion with her hand while trying to turn doorknobs, wind-up toys, twist tops, or screw lids on and off jars?
6-20

32. Does your child turn pages in a book, one page at a time?
6-30

33. After your child watches you draw a single circle, ask him to make a circle like yours. Do not let him trace your circle. Does your child copy you by drawing a circle?
5-30

Count as "yes"

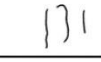


Count as "not yet"

39 up to 54 month children start here:

34. After your child watches you draw a line from the top of the paper to the bottom with a pencil, crayon, or pen, ask him to make a line like yours. Do not let your child trace your line. Does your child copy you by drawing a single line in a vertical direction?
3-27

Count as "yes"



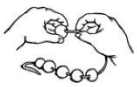
Count as "not yet"

35. After your child watches you draw a line from one side of the paper to the other side, ask her to make a line like yours. Do not let your child trace your line. Does your child copy you by drawing a single line in a horizontal direction?
6-27

Count as "yes"

Count as "not yet"

36. Can your child string small items such as beads, macaroni or pasta "wagon wheels", onto a string or shoelace?
6-22



37. Does your child try to cut paper with child-safe scissors? She does not need to cut the paper but must get the blades to open and close while holding the paper with the other hand. (You may show your child how to use scissors. Carefully watch your child's use of scissors for safety reasons.)
6-33

Subtotal ____ ____ ____ ____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Fine Motor

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
38. When drawing, does your child hold a pencil, crayon, or pen between her fingers and thumb like an adult does? 6-36				
39. Does your child put together a five to seven piece interlocking puzzle? (If one is not available, take a full-page picture from a magazine or catalog and cut it into six pieces. Does your child put it back together correctly?) 5-42				
40. Does your child unbutton one or more buttons? (Your child may use his own clothing or a doll's clothing.) 4-48				
41. Using the shape at right to look at, does your child copy it onto a large piece of paper using a pencil or crayon, without tracing? (Your child's drawing should look like the design of the shape, except it may be different in size.) 6-42 				
42. Does your child draw pictures of people that have at least three of the following features: head, eyes, nose, mouth, neck, hair, trunk, arms, hands, legs, or feet? 5-48				
43. Does your child cut up soft food into smaller pieces using a dull knife? For example, can your child use a butter knife to cut bananas or mangos? (Please supervise your child on this item.) 8p				
44. Using child-safe scissors, does your child cut a paper in half on a more or less straight line, making the blades go up and down? (Carefully watch your child's use of scissors for safety reasons.) 2-48 				
45. Can your child hold 5 or more playing cards so they look like a fan? 4p				

Subtotal ____ ____ ____ ____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Fine Motor

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
46. Does your child button large sized buttons (larger than 1/2 inch in size)? 6p				
47. Can your child buckle a seat belt when riding in a car? 12p				
48. Ask your child to trace on the line below with a pencil. Does your child trace on the line without going off the line more than two times? (Mark "sometimes" if your child goes off the line three times.) 4-54				
49. Using the shapes below to look at, does your child copy at least three shapes onto a large piece of paper using a pencil or crayon, without tracing? (Your child's drawings should look similar to the design of the shapes below, but they may be different in size.) 3-48				
50. Ask your child to draw a picture of a person on a blank sheet of paper. You may ask your child to "Draw a picture of a girl or a boy." If your child draws a person with head, body, arms, *and* legs, mark "yes." If your child draws a person with only three parts (head, body, arms or legs), mark "sometimes." If your child draws a person with two or fewer parts (head, body, arms, or legs), mark "not yet." 5-54				
51. Does your child color mostly within the lines in a coloring book or within the lines of a 2 inch circle that you draw? (Your child should not go more than 1/4 inch outside the lines on most of the picture.) 6-48				
52. Draw a line across a piece of paper. Using child-safe scissors, does your child cut the paper in half on a more or less straight line, making the blades go up and down? (Carefully watch your child's use of scissors for safety reasons.) 6-54				
53. Can your child cut a 4 inch line across paper that is thick paper (such as light cardboard)? 2p				
Subtotal	___	___	___	___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Fine Motor

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
54. Using the shapes below to look at, does your child copy the shapes in the space below without tracing? (Your child's drawings should look similar to the design of the shapes below, but they may be different in size. Mark "yes" if she can copy all three shapes; mark "sometimes" if your child can copy two shapes.) 4-60				

(Copy shapes below)

55. Print your child's first name. Can your child copy the letters? The letters may be large, backward, or reversed. (Mark "sometimes" if your child copies about half of the letters.) 6-60				

(Space for adult's printing below)

(Space for child's printing below)

56. Does your child cut up soft food such as banana or mango into smaller pieces using the edge of a fork? 7p				
57. Give your child an 8 1/2 by 11inch piece of paper and ask him to fold the short sides together. Does your child fold the paper so that the sides match up within a half inch? 10p				

Subtotal ____ ____ ____ ____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Fine Motor

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
58. Does your child button most buttons on her clothing, including small buttons less than 1/2 inch? 5p				
59. Using the letters below to look at, does your child copy the letters without tracing? Cover up all of the letters except the letter being copied. (Mark "yes" if your child copies four of the letters, and you can read them. Mark "sometimes" if your child copies two or three letters, and you can read them.) 5-60				
60. Draw a 4-inch circle on a piece of paper. Does your child use child-safe scissors to cut it out staying within a 1/4 inch of the lines? (Carefully watch your child's use of scissors for safety reasons.) 1p				
61. Does your child cut up soft food such as banana or mango into smaller pieces using a dull knife in one hand and a fork in the other? 9p				
62. Does your child successfully use a key to unlock the door? 11p				
63. Can your child tie shoelaces making a bow? 3p				

V H T C A

(Copy letters here)

Subtotal ____ ____ ____ ____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Ages and Stages Questionnaires®: Inventory

(For children ages 4 weeks up to 54 months)

Problem Solving

Instructions for completion:

1. Use the following table to find your child's starting point based on his/her age.
2. Read each question carefully and check the box that tells whether your child is doing the activity **yes (regularly), sometimes, or not yet**.
3. Try each activity unless you are certain that your child can already do the item, or you know they cannot yet do the item.

Please note: there may be some activities that your child used to do, but has replaced with a more advanced skill (for example, older children no longer put toys in their mouths). Answer these items as "Yes".

Starting points for the Problem Solving domain:

If your child's age is:	Start with item:	Page:
1 up to 3 months	1	2
3 up to 6 months	3	2
6 up to 9 months	6	2
9 up to 12 months	12	3
12 up to 18 months	17	3
18 up to 24 months	24	4
24 up to 30 months	28	4
30 up to 36 months	34	5
36 up to 45 months	39	6
45 up to 54 months	45	7

Tips for completing the ASQ™:Inventory

- Try to make completing this questionnaire a game that is fun for you and your child.
- Make sure your child is rested, fed, and ready to play.

Problem Solving

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
1 up to 3 month babies start here:				
1. Does your baby look at objects that are 8-10 inches away? 1-2				
2. When you move a small toy up and down slowly in front of your baby's face (about 10 inches away), does your baby follow the toy with his eyes? 4-2				
3 up to 6 month babies start here:				
3. When you move a toy slowly from side to side in front of your baby's face (about 10 inches away), does your baby follow the toy with her eyes, sometimes turning her head? 3-2				
4. When you move around, does your baby follow you with his eyes? 2-2				
5. When you put a toy in her hand, does your baby look at it? 4-4				
6 up to 9 month babies start here:				
6. When you hold your baby in a sitting position, does she look at a toy (about the size of a cup or rattle) that you place on the table or floor in front of her? 5-2				
7. When you put a toy in his hand, does your baby put the toy in his mouth? 5-4				
8. When you dangle a toy above your baby while he is lying on his back, does he wave his arms toward the toy? 6-2 				
9. Does your baby pick up a toy and put it in his mouth? 4-6 				
10. When your baby is on his back, does he turn his head to look for a toy when he drops it? (If he already picks it up, mark "yes" for this item.) 2-6				
11. When your baby is on her back, does she try to get a toy she has dropped if she can see it? 3-6				
Subtotal	___	___	___	___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Problem Solving

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th

9 up to 12 month babies start here:

12. Does your baby play by banging a toy up and down on the floor or table?
6-6

13. When a toy is in front of your baby, does she reach for it with both hands?
1-6

14. Does your baby pass a toy back and forth from one hand to the other?
5-6

15. When holding a toy in his hand, does your baby bang it against another toy on the table?
6-8

16. Does your baby pick up two small toys, one in each hand, and hold onto them for about 1 minute?
5-8

12 up to 18 month children start here:

17. After watching you hide a small toy under a piece of paper or cloth, does your child find it? (Be sure the toy is completely hidden.)
6-10

18. While holding a small toy in each hand, does your child clap the toys together (like "Pat-a-cake")?
4-10

19. Does your child poke at or try to get a crumb or Cheerio that is inside a clear bottle (such as a plastic soda-pop bottle or baby bottle)?
5-10

20. If you put a small toy into a bowl or box, does your child copy you by putting in a toy, although she may not let go of it? (If she already lets go of the toy into a bowl or box, mark "yes" for this item.)
4-12

21. Does your child drop two small toys, one after the other, into a container like a bowl or box? (You may show him how to do it.)
5-12

Subtotal ____ ____ ____ ____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Problem Solving

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
22. If you give your child a bottle, spoon, or pencil upside down, does she turn it right side up so that she can use it properly? 4-20				
23. After you scribble back and forth on paper with a crayon (or a pencil or pen), does your child copy you by scribbling? (If she already scribbles on her own, mark "yes" for this item.) 6-12				

18 up to 24 month children start here:

24. Does your child drop several (3 or more) small toys, one after another, into a container like a bowl or box? (You may show her how to do it.) 5-14				
25. Can your child drop a crumb or Cheerio into a small, clear bottle (such as a plastic soda-pop bottle or baby bottle)? 4-14				
26. Without your showing him how, does your child scribble back and forth when you give him a crayon (or pencil or pen)? 5-16				
27. After a crumb or Cheerio is dropped into a small, clear bottle, does your child turn the bottle upside down to dump it out? (You may show him how.) 6-16				

24 up to 30 month children start here:

28. After a crumb or Cheerio is dropped into a small, clear bottle, does your child turn the bottle upside down to dump out the crumb or Cheerio? (Do not show her how.) 6-18				
29. If you do any of the following gestures, does your child copy at least one of them? 3-20 a. Open and close your mouth b. Blink your eyes c. Pull on your earlobe d. Pat your cheek				
30. Does your child put things away where they belong? For example, does he know his toys belong on the toy shelf, his blanket goes on his bed, and dishes go in the kitchen? 4-24				
Subtotal	___	___	___	___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Problem Solving

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th

31. Does your child pretend objects are something else? For example, does your child hold a cup to his ear, pretending it is a telephone? Does he put a box on his head, pretending it is a hat? Does he use a block or small toy to stir food?
3-22

32. While your child watches, line up four objects like blocks or cars in a row. Does your child copy or imitate you and line up at least *two* blocks side by side? (You can also use spools of thread, small boxes, or other toys.)
5-20

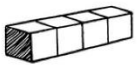
33. If your child wants something he cannot reach, does he find a chair or box to stand on to reach it (for example, to get a toy on a counter or to "help" you in the kitchen)?
6-20

30 up to 36 month children start here:

34. After you have shown your child how, does he try to get a small toy that is slightly out of reach by using a spoon, stick, or similar tool?
6-14

35. When looking in the mirror, ask "Where is _____?" (Use your child's name.) Does your child point to his image in the mirror?
3-27

36. While your child watches, line up four objects like blocks or cars in a row. Does your child copy or imitate you and line up *four* objects in a row? (You can also use spools of thread, small boxes, or other toys.)
6-24



37. Show your child how to make a bridge with blocks, boxes, or cans, like the example. Does your child copy you by making one like it?
5-36

38. When you say, "Say 'seven three,'" does your child repeat *just* the two numbers in the same order? *Do not repeat the numbers.* If necessary, try another pair of numbers and say, "Say 'eight two.'" Your child must repeat just one series of two numbers for you to answer "yes" to this question.
5-30

Subtotal ____ ____ ____ ____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Problem Solving

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th

36 up to 45 month children start here:

39. Does your child dress up and "play-act," pretending to be someone or something else? For example, your child may dress up in different clothes and pretend to be a mommy, daddy, brother, or sister, or an imaginary animal or figure.
6-42

40. When you point to the figure and ask your child, "What is this?" does your child say a word that means a person or something similar? (Mark "yes" for responses like "snowman," "boy," "man," "girl," "Daddy", "spaceman" and "monkey".)
6-27

41. Without your giving help by pointing, does your child follow three different directions using the words "under," "between," and "middle"? For example, ask your child to put a shoe "under the couch." Then ask her to put the ball "between the chairs" and the book "in the middle of the table."
3-48

42. When you say, "Say 'five eight three,'" does your child repeat *just* the three numbers in the same order? *Do not repeat the numbers.* If necessary, try another series of numbers and say, "Say 'six nine two.'" (Your child must repeat just one series of three numbers for you to answer "yes" to this question.)
6-36

43. After your child draws a "picture," even a simple scribble, does she tell you what she drew? (You may say, "Tell me about your picture," or ask, "What is this?" to prompt her.)
6-30

44. After watching you draw a line from the top of the paper to the bottom with a crayon (or pencil or pen), does your child copy you by drawing a single line on the paper in *any direction?* (Mark "not yet" if your child scribbles back and forth.)
5-18

Count as "yes"

Count as "not yet"

Subtotal ___ ___ ___ ___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

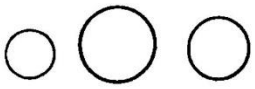
Problem Solving

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th

45 up to 54 month children start here:

45. When asked, "Which circle is the smallest?" does your child point to the smallest circle? (Ask this question without providing help by pointing, gesturing, or looking at the smallest circle.)
5-42



46. When shown objects and asked, "What color is this?" does your child name five different colors like red, blue, yellow, orange, black, white, or pink? (Mark "yes" only if your child answers the question correctly using five colors.)
4-48

47. If you place five objects in front of your child, can he count them by saying, "one, two, three, four, five," in order? (Ask this question *without* providing help by pointing, gesturing, or naming.)
6-48

48. Does your child know the following six words for shapes? For example, your child says, "That's a square," when pointing to a box. If she knows at least 3 shapes mark "sometimes".
29p

a. circle c. diamond e. rectangle
b. triangle d. square f. star.

49. Ask your child which of these is the biggest and which is the smallest. Then say, "a house," "a car," and "a cup." Can you child tell you which one is the biggest and smallest?
21p

50. Show the 26 printed letters of the alphabet to your child. Can your child correctly name more than 10 of them? If the child can name 7, mark "sometimes."
27p

Subtotal ___ ___ ___ ___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Problem Solving

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th

51. Does your child finish the following sentences using a word that means the opposite of the word that is italicized? For example: "A rock is *hard*, and a pillow is *soft*." Please write your child's responses below:

    A cow is *big*, and a mouse is _____.
    Ice is *cold*, and fire is _____.
    We see stars at *night*, and we see the sun during the _____.
    When I throw the ball *up*, it comes _____.

    (Mark "yes" if she finishes three of four sentences correctly. Mark "sometimes" if she finishes two of four sentences correctly.)
    4-60

52. Does your child know the names of numbers? (Mark "yes" if he identifies the three numbers below. Mark "sometimes" if he identifies two numbers.)
    6-54

    3 1 2

53. Does your child name at least four letters in her name? Point to the letters and ask, "What letter is this?" (Point to the letters out of order.)
    6-60

54. Does your child know printed numbers from 1 to 10? For example, when you point to a number in a book, on cards, or on road signs, does your child correctly name the numbers? (If your child knows at least 5 numbers, mark "sometimes".)
    31p

55. Does your child count up to 15 without making mistakes? If so, mark "yes." If your child counts to 12 without making mistakes, mark "sometimes."
    5-54

56. Can your child show you her left hand or her left foot?
    22p

57. Does your child know the sounds of 5 of these letters? s, t, k, m, p, c, f, j.
    28p

58. Does your child count up to 20?
    9p

59. Put a penny, nickel, and dime in front of your child. Can your child point to the penny?
    13p

Subtotal ___ ___ ___ ___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Problem Solving

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
60. Does your child say the days of the seven week in the correct order? 14p				
61. Ask your child what day comes before and after Friday, does your child answer correctly? Mark "sometimes" if your child can name one of the days. 15p				
62. Ask your child what is 6 minus (or take away) 1, 4 minus 2, and 8 minus 3. Does your child correctly subtract one number from another? They can use their fingers to count. 16p				
63. Does your child tell you if a spoken or printed word has the same or different beginning and ending sounds? For example, CAR and CAKE have the same beginning sounds. BEG and DOG have the same end sounds. MAMA and LLAMA have different beginning sounds. TOP and TOY have different ending sounds. 30p				
64. Can your child count past "40"? 10p				
65. Does your child correctly spell 3-letter words? For example, "cat," "dog," "pen". 18p				
66. Can your child tell you all 12 months of the year? Mark "Sometimes" if your child can tell you more than 6 months of the year. 19p				
67. Ask your child what is 4 plus 2, 3 plus 5, 7 plus 1. Does your child correctly add the numbers? They can use their fingers to count. 17p				
68. Can your child count to 100 by 10's? 11p				
Subtotal	___	___	___	___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Ages and Stages Questionnaires®: Inventory

(For children ages 4 weeks up to 54 months)

Personal-Social

Instructions for completion:

1. Use the following table to find your child's starting point based on his/her age.
2. Read each question carefully and check the box that tells whether your child is doing the activity **yes (regularly), sometimes, or not yet**.
3. Try each activity unless you are certain that your child can already do the item, or you know they cannot yet do the item.

Please note: there may be some activities that your child used to do, but has replaced with a more advanced skill (for example, older children are no longer fed by bottles). Answer these items as "Yes".

Starting points for the Cognitive domain:		
If your child's age is:	Start with item:	Page:
1 up to 3 months	1	2
3 up to 6 months	5	2
6 up to 9 months	8	2
9 up to 12 months	11	2
12 up to 18 months	15	3
18 up to 24 months	21	3
24 up to 30 months	27	4
30 up to 36 months	31	4
36 up to 45 months	36	5
45 up to 54 months	41	5

Tips for completing the ASQ™:Inventory

- Try to make completing this questionnaire a game that is fun for you and your child.
- Make sure your child is rested, fed, and ready to play.

Personal-Social

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

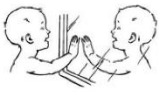
1 up to 3 month babies start here:

	1st	2nd	3rd	4th
1. Does your baby cry when he is hungry, wet, tired, or wants to be held? 2-2				
2. Does your baby sometimes try to suck, even when he's not feeding? 1-2				
3. Does your baby smile at you? 3-2				
4. When you smile at your baby, does he smile back? 4-2				

3 up to 6 month babies start here:

5. When your baby sees the breast or bottle, does he seem to know he is about to be fed? 6-2				
6. Before you smile or talk to your baby, does he smile when he sees you nearby? 5-4				
7. Does your baby watch her hands? 5-2 				

6 up to 9 month babies start here:

8. When your baby has her hands together, does she play with her fingers? 2-4				
9. When in front of a large mirror, does your baby smile or coo at herself? 6-4 				
10. While lying on her back, does your baby play by grabbing her foot? 3-6 				

9 up to 12 month babies start here:

11. Does your baby try to get a toy that is out of reach? (She may roll, pivot on her tummy, or crawl to get it.) 6-6				

Subtotal ___ ___ ___ ___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Personal-Social

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
12. Does your baby help hold the bottle with both hands at once, or when nursing, does she hold the breast with her free hand? 4-4				
13. When in front of a large mirror, does your baby reach out to pat the mirror? 4-6 				
14. Does your baby feed himself a cracker or a cookie? 6-8				
12 up to 18 month children start here:				
15. Does your child drink water, juice, or formula from a cup while you hold it? 5-8				
16. Does your child act differently toward strangers than he does with you and other familiar people? (Reactions to strangers may include staring, frowning, withdrawing, or crying.) 2-6				
17. While your child is on his back, does he put his foot in his mouth? 5-6 				
18. When you dress your child, does he push his arm through a sleeve once his arm is started in the hole of the sleeve? 5-10				
19. When you hold out your hand and ask for her toy, does your child offer it to you even if she doesn't let go of it? (If she already lets go of the toy into your hand, mark "yes" for this item.) 4-10				
20. When you hold out your hand and ask for her toy, does your child let go of it into your hand? 6-10				
18 up to 24 month children start here:				
21. Does your child roll or throw a ball back to you so that you can return it to him? 5-12				
Subtotal	____	____	____	____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Personal-Social

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
22. Does your child play with a doll or stuffed animal by hugging it? 6-12				
23. When you dress your child, does he lift his foot for his shoe, sock, or pant leg? 4-12				
24. Does your child copy the activities you do, such as wipe up a spill, sweep, shave, or comb hair? 6-18				
25. Does your child push a little wagon, stroller, or other toy on wheels, steering it around objects and backing out of corners if she cannot turn? 6-22				
26. Does your child feed herself with a spoon, even though she may spill some food? 4-14				

24 up to 30 month children start here:

27. Does your child get your attention or try to show you something by pulling on your hand or clothes? 6-14				
28. Does your child come to you when she needs help, such as with winding up a toy or unscrewing a lid from a jar? 6-16				
29. Does your child use a spoon to feed himself with little spilling? 2-30				
30. Does your child drink from a cup or glass, putting it down again with little spilling? 5-18				

30 up to 36 month children start here:

31. If you do any of the following gestures, does your child copy at least one of them? 2-22				

a. Open and close your mouth. b. Blink your eyes.
c. Pull on your earlobe. d. Pat your cheek.

Subtotal ____ ____ ____ ____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Personal-Social

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
32. Does your child help undress herself by taking off clothes like socks, hat, shoes, or mittens? 5-14				
33. Does your child eat with a fork? 6-20				
34. Does your child take turns by waiting while another child or adult takes a turn? 6-36				
35. When playing with either a stuffed animal or doll, does your child pretend to rock it, feed it, change its diapers, put it to bed, and so forth? 5-20				

36 up to 45 month children start here:

36. When your child is looking in a mirror and you ask, "Who is in the mirror?" does he say either "me" or his own name? 6-30				
37. While looking at himself in the mirror, does your child offer a toy to his own image? (Mark "yes" if your child used to do this when he was younger.) 4-16				
38. After you put on loose-fitting pants around his feet, does your child pull them completely up to his waist? 5-30				
39. Does your child call herself "I" or "me" more often than her own name? For example, "I do it," more often than "Juanita do it." 6-24				
40. Does your child feel proud of the things she is able to do? For example, she might show you a picture she drew and say, "Look at what I made!" 23sp				

45 up to 54 month children start here:

41. Using these exact words, ask your child, "Are you a girl or a boy?" Does your child answer correctly? 6-33				
42. Does your child tell you what he or she likes and does not like? For example, your child says, "I love chocolate cake," or "I don't like to play dolls." 17sp				
Subtotal	____	____	____	____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Personal-Social

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

		1st	2nd	3rd	4th
43.	Does your child wash her hands using soap and water and dry off with a towel without help? 6-42				
44.	Does your child usually take turns and share with other children? 6-60				
45.	Does your child dress or undress herself without help (except for snaps, buttons, and zippers)? 6-48				
46.	Does your child tell you the names of two or more playmates, not including brothers and sisters? (Ask this question without providing help by suggesting names of playmates or friends.) 4-48				
47.	Does your child use the toilet by himself? (He goes to the bathroom, sits on the toilet, wipes, and flushes.) Mark "yes" even if he does this after you remind him. 5-60				
48.	Does your child put on a coat, jacket, or shirt by himself? 6-27				
49.	Does your child do the following by himself? Wash hands, blow nose, brush teeth, and comb/brush hair. 2ap				
50.	When you cross the street with your child, does she know how to look both ways before crossing? 3ap				
51.	Does your child pour liquid from one container to another? For example does he pour juice from a small pitcher into a cup? 8ap				
52.	Does your child know how to behave when you take her out to a public place? For example when you are at a library, church, or grocery store? 11ap				
53.	Does your child serve herself, taking food from one container to another using utensils? For example, does your child use a large spoon to scoop applesauce from a jar into a bowl? 5-42				
54.	Does your child stay away from dangerous things? For example, a hot stove or moving cars. 10ap				
	Subtotal	____	____	____	____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Personal-Social

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
55. Does your child tell you at least four of the following? Please mark the items your child knows. 2-48 a. First name d. Last name b. Age e. Boy or girl c. City she lives in f. Telephone				
56. Does your child begin activities and encourage friends to join in? For example does your child say, "Come on, let's build a house. You make the garage." 9sp				
57. Does your child brush his teeth by putting toothpaste on the toothbrush and brushing all his teeth without help? (You may still need to check and re-brush your child's teeth.) 5-48				
58. Does your child do most of the bath time routine by herself (with your supervision)? Does she take off clothes, get into the tub, clean her body, and dry herself off? 9ap				
59. Does your child take turns when playing a sit down game such as board games or cards? 22sp				
60. Does your child take part in an adult-led large group activity with other children for at least 10-15 minutes? For example, circle time with more than 5 kids? 15sp				
61. Does your child tell an adult when he or she is having trouble with a friend? 11sp				
62. Does your child dress and undress himself, including buttoning medium-size buttons and zipping front zippers? 6-54				
63. Does your child try to solve a conflict with playmates? For example, your child might say, "I'll play with the ball first, and then it's your turn." 8sp				
64. Does your child claim a toy that belongs to him by taking the toy back or by saying, "That's mine!" 10sp				
Subtotal	___	___	___	___

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

Personal-Social

Please mark either a:
Y for Yes,
S for Sometimes, and
N for Not Yet

	1st	2nd	3rd	4th
65. Does your child ask before using other people's things? 21sp				
66. Does your child begin playing with toys and finish the activity without being told? For example, your child gets out a puzzle, puts it together, and puts it away. 13sp				
67. Does your child know what to do in an emergency? For example, does he know how to call an adult or dial 911 for help? 13ap				

Subtotal ____ ____ ____ ____

Remember: **Stop** when you have marked 3 'Not Yet's in a row, **circle** them, & write the **date**.

儿童姓名：　　儿童个案编号:　　医师：

ASQ-INVENTORY 跨龄版家长问卷

Caregiver Utility Questionnaire

1. 您与主持评估的医师大概花了多久完成全套五个能区的 ASQ-I 跨龄版问卷呢？

_____分钟

How long do you estimate it took you and the data collector to complete the ASQ:Inventory on your child? _____minutes.

2. 您的孩子接受过使用其他工具的发育评估吗？请选择：_____

What are some other developmental assessment tools you and your child had experiences with in the past? _____

A. 盖泽尔发育量表（Beijing Gesell Developmental Schedule）
B. 贝莉婴幼儿发育量表（Bayley Scales of Infant and Toddler Development, Chinese version ）
C. 年龄与发育进程问卷（Ages & Stages Questionnaires, Chinese version）
D. 其他工具（请说明: _____）
Other tools. (Please describe:_____)
E. 不，我的孩子没有接受过其他工具的发育评估
I had no experiences with other tools.

3. 如果您的孩子过去用过其他发育评估工具，与本次使用的 ASQ-I 跨龄版相比，有何区别？如果上一题选 E，请说说这次使用的 ASQ:Inventory 跨龄版的优缺点。
If your child was assessed with other developmental measures in the past, what are some differences you found between the other tools and the ASQ:Inventory? If you chose "E" for the second question, please describe what you liked and disliked about the ASQ:Inventory.

区别	其他工具 Other Assessments	ASQ-Inventory 跨龄版 ASQ:Inventory
1)		
2)		
3)		

对以下陈述，您是否同意？请在最合适的选项下打"√"

Please check the box that best represent your perspective of each statement.

儿童姓名：　　儿童个案编号:　　医师：

陈述 Statement	非常不同意 Strongly disagree	不同意 Dis-agree	中立 I don't know	同意 Agree	非常同意 Strongly agree
4. 完成 ASQ-I 跨龄版的评估之后，我对孩子的发育现状有了**更好**的了解。 I feel understanding my child's development BETTER after participating in the ASQ:Inventory assessment					
5. ASQ-I 跨龄版所评估的技能，我认为对孩子来说很关键，而且体现了这个年龄段孩子的特征。 I think the skills described in the ASQ:Inventory items are critical and representative to my child's age.					
6. 在 ASQ-I 跨龄版评估的过程中，我觉得我对于孩子的发育现状的判断受到了重视。 During the ASQ:Inventory assessment, I felt that my opinions about my child's development were given serious considerations.					
7. 如果我的亲戚朋友担心他们孩子的发育有问题，我会向他们推荐 ASQ-I 跨龄版。 I would recommend using the ASQ:Inventory if my friend has concerns of their child's development.					

请将本问卷交回主持评估的工作人员。衷心感谢您对 ASQ-I 跨龄版的肯定和支持！

Thank you for providing your feedback to help improve the tool!

ASQ-INVENTORY 访谈问卷

Pediatrician Interview Script

I. 评价 ASQ:Inventory 跨龄版（Experiences with the ASQ:Inventory）

1. 对每个孩子，您大概花多久完成全套五个能区的 ASQ-Inventory 跨龄版问卷呢？如果不同年龄的孩子使用时间不一样，请分别说明：
Approximately how long did it take to complete all five domains of the ASQ:Inventory on one child? If it was different for different ages, please described specifically.

2. 您使用过其他工具的发育评估吗？例如，北京盖泽尔，贝莉 2，年龄与发育进程问卷，或其他工具？
Have you used other developmental assessment tools at work? Such as the Beijing GDS, the Bayley II, the ASQ-C, or others?

3. 如果您用过其他发育评估工具，那么本次使用的 ASQ-Inventory 跨龄版与其他工具相比，有何区别？如果上一题选 E，请说说您认为 ASQ:Inventory 跨龄版具有哪些优缺点。
If pediatrician had experiences with other developmental assessment tools ---- please talk about the advantages and disadvantages of the ASQ:Inventory when compared to other tools.
If pediatrician had no experience with other tools ---- please talk about what you think are the advantages and disadvantages of the ASQ:Inventory.

4. ASQ-Inventory 跨龄版所评估的技能，您认为对孩子来说是否关键，而且体现了这个年龄段孩子的特征？请举例说明。
How do the ASQ:Inventory items represent critical skills for children at their age level? Would you use an example to describe?

5. 您在日常工作中，需要筛查发育迟缓的儿童吗？如果需要，您认为 ASQ-Inventory 跨龄版是否对此有帮助？

Are you responsible for screening children with developmental delays at work? If yes, do you think the ASQ:Inventory is helpful for your clinical decisions?

6. 您在日常工作中，需要诊断发育迟缓的儿童吗？如果需要，您认为 ASQ-Inventory 跨龄版是否对此有帮助？
Are you responsible for diagnosing children with developmental delays at work? If yes, do you think the ASQ:Inventory is helpful for your clinical decisions?

7. ASQ-Inventory 跨龄版的排版格式有什么优缺点？例如，各个能区之间翻来翻去会不会很麻烦？

How did you like the format of the ASQ:Inventory protocols? For example, how easy was it to go back and forth between different domains, when all five domains were stapled together?

9. 您对于 ASQ-Inventory 跨龄版有什么其他建议，是前面我们没谈到的？
Do you have other comments, questions or suggestions about the ASQ:Inventory, that we did not talk about?

II. 基本信息 （Demographic Information）

1. 请问您的工作单位和职位是什么。
   Which clinic or hospital are you working at? What is your current title?
2. 请问您的最高学历和相关专业是什么。
   What is your highest degree? What' s your major for this degree?
3. 请问您在哪年出生？
   What is your birth year?
4. 请问您从事 3 岁以下婴幼儿医疗保健工作多少年了？
   How many years have you been practicing child health care for babies and toddlers under 3 years old?
5. 请问您从事 3 岁以下婴幼儿发育评估工作多少年了？
   How many years have you been conducting developmental assessment for this population?

APPENDIX B

UNADJUSTED AND ADJUSTED MEANS BY DOMAIN AND

COMPLETION METHOD

Table 22. *Adjusted and Unadjusted Completion Method Means and Variability for Communication Domain Score of the ASQ:Inventory, Using Age as a Covariate*

Domain	*n*	Unadjusted		Adjusted	
		M	*SD*	*M*	*SD*
Chinese Paper-pencil	774	38.33	20.19	36.84	0.32
U.S. paper-pencil	182	31.66	17.63	44.43	0.66
U.S. On-line	243	45.58	20.61	40.63	0.56

Table 23. *One-Way ANCOVA for Communication Domain Score of the ASQ:Inventory as a Function of Completion Method by Country, Using Age as a Covariate*

Source	*df*	*MS*	*F*	eta^2
Age	1	377527.64	5107.12***	.81
Method and country	2	4524.96	61.21***	.10
Error	1195	73.92		
Total	1199			

*** $p < .001$

Table 24. *Adjusted and Unadjusted Completion Method Means and Variability for Gross Motor Domain Score of the ASQ:Inventory, Using Age as a Covariate*

Domain	*n*	Unadjusted		Adjusted	
		M	*SD*	*M*	*SD*
Chinese Paper-pencil	772	41.65	23.20	40.02	.27
U.S. paper-pencil	214	28.54	17.41	43.58	.52
U.S. On-line	265	52.66	23.34	45.13	.45

Table 25. *One-Way ANCOVA for Gross Motor Domain Score of the ASQ:Inventory as a Function of Completion Method by Country, Using Age as a Covariate*

Source	*df*	*MS*	*F*	eta^2
Age	1	545745.39	10403.40***	.90
Method and country	2	2990.76	57.01***	.09
Error	1247	52.46		
Total	1251			

*** $p < .001$

Table 26. *Adjusted and Unadjusted Completion Method Means and Variability for Fine Motor Domain Score of the ASQ:Inventory, Using Age as a Covariate*

Domain	*n*	Unadjusted		Adjusted	
		M	*SD*	*M*	*SD*
Chinese Paper-pencil	774	38.34	19.87	35.53	0.21
U.S. paper-pencil	213	25.96	17.15	37.36	0.41
U.S. On-line	48	50.73	14.62	44.00	0.84

Table 27. *One-Way ANCOVA for Fine Motor Domain Score of the ASQ:Inventory as a Function of Completion Method by Country, Using Age as a Covariate*

Source	*df*	*MS*	*F*	eta^2
Age	1	334229.35	10036.77***	.91
Method and country	2	1762.66	52.93***	.10
Error	1031	33.30		
Total	1035			

*** $p < .001$

Table 28. *Adjusted and Unadjusted Completion Method Means and Variability for Problem Solving Domain Score of the ASQ:Inventory, Using Age as a Covariate*

Domain	*n*	Unadjusted		Adjusted	
		M	*SD*	*M*	*SD*
Chinese Paper-pencil	774	38.63	23.26	35.41	0.23
U.S. paper-pencil	213	24.82	18.56	38.37	0.45
U.S. On-line	35	54.83	24.57	41.38	1.07

Table 29. *One-Way ANCOVA for Problem Solving Domain Score of the ASQ:Inventory as a Function of Completion Method by Country, Using Age as a Covariate*

Source	*df*	*MS*	*F*	eta^2
Age	1	459013.16	11583.43***	.92
Method and country	2	1172.80	29.60***	.06
Error	1018	39.63		
Total	1022			

*** $p < .001$

Table 30. *Adjusted and Unadjusted Completion Method Means and Variability for Personal-Social Domain Score of the ASQ:Inventory, Using Age as a Covariate*

Domain	*n*	Unadjusted		Adjusted	
		M	*SD*	*M*	*SD*
Chinese Paper-pencil	771	37.18	21.11	34.67	0.31
U.S. paper-pencil	209	26.42	17.56	39.05	0.60
U.S. On-line	127	50.50	25.39	44.43	0.74

Table 31. *One-Way ANCOVA for Personal-Social Domain Score of the ASQ:Inventory as a Function of Completion Method by Country, Using Age as a Covariate*

Source	*df*	*MS*	*F*	eta^2
Age	1	402930.44	5865.95***	.85
Method and country	2	5879.97	85.60***	.14
Error	1103	68.69		
Total	1107			

*** $p < .001$

APPENDIX C

PERCENTILE SCORES OF CHINESE ASQ:INVENTORY BY DOMAIN

Table 32. *Percentile Scores of the Chinese ASQ:Inventory for Each Age Interval, Communication Domain*

Age Interval*	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2-month	4	6	8	12	15
4-month	12	15	17	21	23
6-month	24	24	27	28	30
8-month	24	28	32	34	37
10-month	27	33	36	40	42
12-month	33	38	44	46	48
14-month	44	46	48	50	54
16-month	45	48	50	56	58
18-month	48	52	56	59	64
20-month	52	58	62	67	72
22-month	50	59	65	72	80
24-month	50	59	65	72	80

Note. 2-month: from 1 month, 0 day to 2 months, 30 days; 4-month: from 3 month, 0 day to 4 months, 30 days; 6-month: from 5 month, 0 day to 6 months, 30 days; 8-month: from 7 month, 0 day to 8 months, 30 days; 10-month: from 9 month, 0 day to 10 months, 30 days; 12-month: from 11 month, 0 day to 12 months, 30 days; 14-month: from 13 month, 0 day to 14 months, 30 days; 16-month: from 15 month, 0 day to 16 months, 30 days; 18-month: from 17 month, 0 day to 18 months, 30 days; 20-month: from 19 month, 0 day to 20 months, 30 days; 22-month: from 21 month, 0 day to 22 months, 30 days; 24-month: from 23 month, 0 day to 24 months, 30 days.

* Based on the age intervals in the Ages & Stages Questionnaires, Chinese version.

Table 33. *Percentile Scores of the Chinese ASQ:Inventory for Each Age Interval, Gross Motor Domain*

Age Interval	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2-month	8	10	14	18	8
4-month	16	17	18	20	16
6-month	22	24	27	29	22
8-month	29	32	34	35	29
10-month	33	36	38	46	33
12-month	42	46	48	54	42
14-month	48	54	58	64	48
16-month	59	66	68	72	59
18-month	64	67	71	75	64
20-month	67	70	72	75	67
22-month	67	72	77	79	67
24-month	72	76	81	84	72

Table 34. *Percentile Scores of the Chinese ASQ:Inventory for Each Age Interval, Fine Motor Domain*

Age Interval	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2-month	7	8	10	12	13
4-month	10	12	14	16	18
6-month	10	12	14	16	18
8-month	28	30	34	38	41
10-month	30	38	40	42	46
12-month	37	42	45	48	49
14-month	44	46	48	51	54
16-month	48	50	52	56	59
18-month	51	54	57	60	63
20-month	55	58	60	64	65
22-month	57	60	62	68	70
24-month	60	63	66	69	73

Table 35. *Percentile Scores of the Chinese ASQ:Inventory for Each Age Interval, Problem Solving Domain*

Age Interval	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2-month	4	6	8	8	10
4-month	8	8	10	14	16
6-month	15	19	23	27	30
8-month	26	30	34	38	40
10-month	29	32	37	40	44
12-month	36	40	42	46	50
14-month	40	44	48	53	60
16-month	48	55	58	64	66
18-month	56	59	63	66	68
20-month	61	65	68	70	72
22-month	58	64	69	72	74
24-month	66	69	72	74	83

Table 36. *Percentile Scores of the Chinese ASQ:Inventory for Each Age Interval, Personal-Social Domain*

Age Interval	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2-month	4	6	8	10	14
4-month	11	12	14	16	18
6-month	18	18	21	26	28
8-month	26	28	32	34	37
10-month	27	32	34	37	43
12-month	32	36	41	43	48
14-month	37	42	47	52	55
16-month	45	52	56	59	64
18-month	51	55	58	62	66
20-month	55	60	63	66	69
22-month	56	59	64	68	74
24-month	60	64	67	72	79

APPENDIX D

IRT ITEM FIT STATISTICS OF CHINESE ASQ:INVENTORY BY DOMAIN

Table 37. *Item Difficulty and Fit Statistics of Chinese ASQ:Inventory Items in Communication Domain*

Item Number	*n*	Difficulty	Unweighted fit MNSQ	Weighted fit MNSQ
44*	774	10.53	0.01	0.43
51*	774	10.53	0.01	0.43
52	774	10.53	0.01	0.43
56*	774	10.53	0.01	0.43
45*	774	9.83	0.01	0.41
46*	774	9.83	0.01	0.40
53	774	9.83	0.01	0.40
54*	774	9.83	0.01	0.40
55*	774	9.83	0.01	0.40
47	774	9.42	0.02	0.38
48	774	9.42	0.02	0.38
49*	774	9.42	0.02	0.38
50*	774	9.42	0.02	0.38
41	774	9.12	0.04	0.52
42	774	8.54	0.04	0.48
43	774	8.40	0.04	0.43
37	774	7.50	0.09	0.64
40	774	7.26	0.09	0.63
39	774	6.92	0.10	0.62
36	774	6.21	0.16	0.72
38	774	6.03	0.12	0.57
33	774	5.42	0.15	0.61
34	774	5.42	0.19	0.73
32	774	5.33	0.28	0.95
35	774	5.33	0.15	0.57
31	774	4.56	0.19	0.60
30	774	4.23	0.25	0.68

Table 37. *(continued)*

Item Number	*n*	Difficulty	Unweighted fit MNSQ	Weighted fit MNSQ
29	774	3.11	0.29	0.70
28	774	2.92	0.26	0.65
25	774	2.78	0.36	0.80
27	774	2.71	0.27	0.65
26	774	2.66	0.27	0.66
24	774	1.43	0.36	0.78
22	774	0.77	0.37	0.73
21	774	0.54	0.25	0.57
23	774	0.37	0.24	0.55
20	774	-0.20	0.24	0.57
19	774	-0.26	0.55	0.73
18	774	-0.65	0.25	0.59
16	774	-1.68	0.24	0.57
13	774	-1.76	0.31	0.68
15	774	-1.85	0.25	0.60
17	774	-1.99	2.62	0.61
14	774	-2.44	0.23	0.55
12	774	-3.55	0.24	0.66
11	774	-4.09	0.21	0.58
10	774	-4.47	0.16	0.55
9	774	-4.49	0.17	0.58
7	774	-4.99	0.19	0.67
8	774	-5.07	0.18	0.65
4	774	-6.07	0.36	0.84
6	774	-6.28	0.13	0.57
5	774	-6.95	0.12	0.61
2	774	-7.11	0.16	0.80
3	774	-7.74	0.13	0.80

Note. An MNSQ value smaller than ¾ is considered indicating "*overfit*", while larger than 4/3 is considered "*underfit*".

* Difference between item order in the questionnaire and detected item difficulty exceeded four spots.

Table 38. *Item Difficulty and Fit Statistics of Chinese ASQ:Inventory Items in Gross Motor Domain*

Item Number	*n*	Difficulty	Unweighted fit MNSQ	Weighted fit MNSQ
46	774	10.82	0.01	0.28
47	774	10.12	0.03	0.37
43	774	8.83	0.05	0.52
42	774	8.27	0.10	0.70
45	774	8.18	0.08	0.56
44	774	8.09	0.12	0.66
38	774	7.27	0.12	0.62
41	774	6.87	0.12	0.58
40	774	6.81	0.19	0.77
39	774	6.63	0.15	0.64
35	774	5.93	0.23	0.82
37	774	5.55	0.30	0.91
34	774	4.96	0.37	0.83
36	774	4.72	0.31	0.79
33	774	4.40	0.26	0.75
32	774	3.50	0.25	0.62
30	774	3.17	0.20	0.57
31	774	3.04	0.25	0.62
28	774	2.93	0.25	0.65
29	774	2.91	0.23	0.63
27	774	2.05	0.17	0.50
24	774	1.98	0.26	0.68
23	774	1.96	0.17	0.51
25	774	1.80	0.17	0.51
26	774	1.38	0.16	0.49
22	774	0.20	0.18	0.52
21	774	0.12	0.16	0.47
20	774	0.04	0.17	0.48
19	774	-0.16	0.17	0.49
18	774	-0.98	0.18	0.54
16	774	-1.03	0.21	0.60

Table 38. *(continued)*

Item Number	*n*	Difficulty	Unweighted fit MNSQ	Weighted fit MNSQ
17	774	-1.38	0.19	0.57
15	774	-2.28	0.18	0.53
13	774	-2.42	0.17	0.49
14	774	-2.60	0.18	0.52
12	774	-2.76	0.20	0.56
11	774	-3.57	0.19	0.56
9	774	-3.86	0.21	0.61
10	774	-3.86	0.22	0.64
8	774	-5.13	0.20	0.66
7	774	-5.62	0.17	0.60
6	774	-5.91	0.19	0.65
5	774	-6.70	0.16	0.64
3	774	-7.61	0.13	0.63
2	774	-7.71	0.11	0.58
4	774	-8.42	0.07	0.52
1	774	-10.88	0.01	0.34

Note. An MNSQ value smaller than ¾ is considered indicating "*overfit*", while larger than 4/3 is considered "*underfit*".

* Difference between item order in the questionnaire and detected item difficulty exceeded four spots.

Table 39. *Item Difficulty and fit Statistics of Chinese ASQ:Inventory Items in Fine Motor Domain*

Item Number	*n*	Difficulty	Unweighted fit MNSQ	Weighted fit MNSQ
43	774	10.72	0.01	0.32
40	774	10.02	0.05	0.54
38	774	9.61	0.17	0.57
41	774	9.31	0.05	0.47
42	774	9.08	0.04	0.47
39	774	8.35	0.05	0.44
37	774	7.48	0.13	0.71
36	774	7.38	0.11	0.66
32	774	6.72	0.22	0.81
34	774	6.39	0.18	0.71
35	774	6.34	0.17	0.72
33	774	6.24	0.24	0.80
29	774	5.44	0.27	0.83
31	774	4.50	0.30	0.78
28	774	4.15	0.29	0.73
30	774	3.95	0.33	0.69
27	774	3.74	0.28	0.63
26	774	3.60	0.58	0.97
24	774	2.73	0.31	0.67
25	774	1.93	0.27	0.67
23	774	1.68	0.32	0.74
22	774	1.06	0.33	0.70
21	774	0.27	0.29	0.65
20	774	0.16	0.31	0.64
19	774	-0.13	0.41	0.71
18	774	-0.62	0.17	0.48
17	774	-0.88	0.19	0.51
16	774	-1.19	0.19	0.51
15	774	-1.49	0.17	0.51
14	774	-2.09	0.15	0.51
13	774	-2.36	0.14	0.50

Table 39. *(continued)*

Item Number	*n*	Difficulty	Unweighted fit MNSQ	Weighted fit MNSQ
11	774	-2.97	0.16	0.48
12	774	-2.97	0.15	0.45
10	774	-3.24	0.14	0.41
9	774	-3.26	0.15	0.46
8	774	-3.80	0.16	0.53
7	774	-4.40	0.2	0.68
6	774	-5.23	0.22	0.76
5	774	-6.43	0.23	0.85
4	774	-6.75	0.17	0.76
2	774	-7.91	0.15	0.73
3	774	-8.92	0.09	0.53
1	774	-9.79	0.04	0.42

Note. An MNSQ value smaller than ¾ is considered indicating "*overfit*", while larger than 4/3 is considered "*underfit*".

* Difference between item order in the questionnaire and detected item difficulty exceeded four spots.

Table 40. *Item Difficulty and Fit statistics of Chinese ASQ:Inventory items in Problem Solving domain*

Item Number	*n*	Difficulty	Unweighted fit MNSQ	Weighted fit MNSQ
49*	774	10.81	0.03	0.46
50	774	10.81	0.02	0.45
52	774	10.81	0.02	0.38
53	774	10.81	0.03	0.46
47	774	10.11	0.02	0.34
51*	774	10.11	0.03	0.44
45	774	9.70	0.02	0.39
46	774	9.70	0.03	0.47
44	774	8.99	0.04	0.44
40	774	8.56	0.07	0.47
42	774	8.45	0.05	0.39
43	774	8.45	0.09	0.45
39	774	8.35	0.09	0.54
36	774	8.17	0.10	0.65
41	774	8.17	0.10	0.50
38	774	8.02	0.13	0.62
37	774	7.22	0.14	0.65
35	774	6.07	0.23	0.75
31	774	5.05	0.32	0.80
33	774	4.49	0.31	0.76
34	774	4.26	0.27	0.74
32	774	3.90	0.34	0.68
29	774	3.86	0.28	0.72
30	774	3.53	0.63	0.70
27	774	3.09	0.19	0.53
28	774	2.95	0.27	0.66
26	774	2.62	0.19	0.51
25	774	2.30	0.29	0.65
21	774	2.01	0.40	0.82
24	774	1.82	0.29	0.66
22	774	1.73	0.34	0.70

Table 40. *(continued)*

Item Number	*n*	Difficulty	Unweighted fit MNSQ	Weighted fit MNSQ
23	774	1.41	0.25	0.63
20	774	0.71	0.31	0.71
18	774	-0.08	0.24	0.63
16	774	-0.72	0.74	0.73
17	774	-1.01	0.21	0.55
14	774	-1.49	0.20	0.59
19*	774	-1.55	0.18	0.55
15	774	-1.86	0.17	0.57
13	774	-2.49	0.14	0.49
10	774	-2.77	0.13	0.44
12	774	-2.83	0.13	0.44
11	774	-2.85	0.17	0.50
8	774	-3.28	0.12	0.43
9	774	-3.53	174.71	0.54
7	774	-3.83	0.15	0.53
6	774	-4.27	0.20	0.64
5	774	-4.70	0.24	0.70
4	774	-4.96	0.23	0.73
2	774	-8.13	0.10	0.56
3	774	-8.28	0.11	0.58
1	774	-9.88	0.02	0.29

Note. An MNSQ value smaller than ¾ is considered indicating "*overfit*", while larger than 4/3 is considered "*underfit*".

* Difference between item order in the questionnaire and detected item difficulty exceeded four spots.

Table 41. *Item Difficulty and Fit statistics of Chinese ASQ:Inventory Items in Personal-Social Domain*

Item Number	*n*	Difficulty	Unweighted fit MNSQ	Weighted fit MNSQ
48*	774	10.58	0.01	0.30
50	774	10.58	0.01	0.30
47*	774	9.88	0.01	0.35
49	774	9.88	0.01	0.24
51	774	9.88	0.01	0.24
52	774	9.88	0.01	0.24
53*	774	9.88	0.01	0.24
54*	774	9.88	0.01	0.24
46	774	9.17	0.03	0.52
45	774	8.94	0.03	0.41
42	774	8.59	0.07	0.64
44	774	8.59	0.04	0.47
39	774	8.21	0.07	0.58
43	774	8.21	0.04	0.40
41	774	7.93	0.11	0.66
40	774	7.28	0.11	0.63
38	774	7.18	0.11	0.62
37	774	6.52	0.18	0.78
34	774	6.31	0.28	0.90
33	774	5.98	0.26	0.86
36	774	5.96	0.21	0.79
35	774	5.54	0.36	0.88
29	774	4.84	0.50	0.84
30	774	4.38	0.31	0.77
32	774	3.23	0.24	0.62
31	774	3.08	0.24	0.61
25	774	2.99	0.37	0.80
26	774	2.76	0.26	0.65
28	774	2.40	0.23	0.57
27	774	1.96	0.21	0.53
24	774	1.55	0.24	0.59

Table 41. *(continued)*

Item Number	*n*	Difficulty	Unweighted fit MNSQ	Weighted fit MNSQ
21	774	1.35	0.47	0.80
22	774	1.32	0.61	0.84
23	774	1.32	0.28	0.64
20	774	0.33	0.35	0.71
18	774	-0.25	0.32	0.71
19	774	-0.37	0.25	0.60
17	774	-0.94	0.68	0.96
15	774	-1.34	0.53	0.78
16	774	-2.02	0.28	0.64
13	774	-2.12	0.30	0.57
14	774	-2.33	0.20	0.51
11	774	-2.41	0.18	0.50
10	774	-2.67	0.23	0.57
12	774	-2.96	0.23	0.59
9	774	-3.74	0.27	0.75
8	774	-4.54	0.49	0.76
7	774	-4.84	0.20	0.66
6	774	-5.86	0.20	0.71
5	774	-6.49	0.23	0.64
4	774	-7.06	0.10	0.51
3	774	-8.05	0.06	0.48
2	774	-8.65	0.11	0.65
1	774	-9.66	0.03	0.45

Note. An MNSQ value smaller than ¾ is considered indicating "*overfit*", while larger than 4/3 is considered "*underfit*".

* Difference between item order in the questionnaire and detected item difficulty exceeded four spots.

APPENDIX E

UNADJUSTED AND ADJUSTED MEANS BY

KNOWN DISABILITY STATUS AND DOMAIN

Table 42. *Adjusted and Unadjusted Disability Status Means and Variability for Communication Domain Score of the ASQ:Inventory, Using Age as a Covariate*

Disability status	*n*	Unadjusted		Adjusted	
		M	*SD*	*M*	*SD*
No	44	59.18	5.82	59.06	1.66
Yes	38	34.39	15.33	34.53	1.79

Table 43. *One-Way ANCOVA for Communication Domain Score of the ASQ:Inventory as a Function of Disability Status, Using Age as a Covariate*

Source	*df*	*MS*	*F*	eta^2
Age	1	552.65	4.55*	.05
Disability	1	12242.04	100.71***	.56
Error	79	121.56		
Total	82			

* $p < .05$; *** $p < .001$

Table 44. *Adjusted and Unadjusted Disability Status Means and Variability for Gross Motor Domain Score of the ASQ:Inventory, Using Age as a Covariate*

Disability status	*n*	Unadjusted		Adjusted	
		M	*SD*	*M*	*SD*
No	44	69.25	5.07	69.16	1.64
Yes	38	36.61	15.15	36.71	1.76

Table 45. *One-Way ANCOVA for Gross Motor Domain Score of the ASQ:Inventory as a Function of Disability Status, Using Age as a Covariate*

Source	*df*	*MS*	*F*	eta^2
Age	1	295.13	2.51	.03
Disability	1	21430.77	181.93***	.70
Error	79	117.80		
Total	82			

*** $p < .001$

Table 46. *Adjusted and Unadjusted Disability Status Means and Variability for Fine Motor Domain Score of the ASQ:Inventory, Using Age as a Covariate*

Disability status	*n*	Unadjusted		Adjusted	
		M	*SD*	*M*	*SD*
No	44	59.68	3.87	59.58	1.69
Yes	38	33.74	16.23	33.86	1.82

Table 47. *One-Way ANCOVA for Fine Motor Domain Score of the ASQ:Inventory as a Function of Disability Status, Using Age as a Covariate*

Source	*df*	*MS*	*F*	eta^2
Age	1	438.02	3.48	.04
Disability	1	13454.19	106.75**	.58
Error	79	126.04		
Total	82			

** $p < .01$

Table 48. *Adjusted and Unadjusted Disability Status Means and Variability for Problem Solving Domain Score of the ASQ:Inventory, Using Age as a Covariate*

Disability status	*n*	Unadjusted		Adjusted	
		M	*SD*	*M*	*SD*
No	44	66.16	4.41	66.08	1.81
Yes	38	33.13	17.09	33.23	1.95

Table 49. *One-Way ANCOVA for Problem Solving Domain Score of the ASQ:Inventory as a Function of Disability Status, Using Age as a Covariate*

Source	*df*	*MS*	*F*	eta^2
Age	1	273.61	1.90	.02
Disability	1	21948.45	152.52***	.66
Error	79	143.91		
Total	82			

*** $p < .001$

Table 50. *Adjusted and Unadjusted Disability Status Means and Variability for Personal-Social Domain Score of the ASQ:Inventory, Using Age as a Covariate*

Disability status	*n*	Unadjusted		Adjusted	
		M	*SD*	*M*	*SD*
No	44	60.98	5.31	60.91	1.77
Yes	38	29.76	16.33	29.84	1.91

Table 51. *One-Way ANCOVA for Personal-Social Domain Score of the ASQ:Inventory as a Function of Disability Status, Using Age as a Covariate*

Source	*df*	*MS*	*F*	eta^2
Age	1	192.69	1.40	.02
Disability	1	19628.43	142.38***	.64
Error	79	137.86		
Total	82			

*** $p < .001$

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